BUILDING INFORMATION MODELLING
for General Building Plan Submission (Phase One)
Consultancy Report
FEB-2017

CIC Preparation of BIM Standards for General Building Plan Submission (Phase One)
FEB 2017
Disclaimer

Whilst reasonable efforts have been made to ensure the accuracy of the information contained in this publication, the CIC nevertheless would encourage readers to seek appropriate independent advice from their professional advisers where possible and readers should not treat or rely on this publication as a substitute for such professional advice for taking any relevant actions.

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<tr>
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### Definition of Abbreviation

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<tr>
<td>CIC</td>
<td>Construction Industry Council, Hong Kong</td>
</tr>
<tr>
<td>BD</td>
<td>Buildings Department</td>
</tr>
<tr>
<td>LandsD</td>
<td>Lands Department</td>
</tr>
<tr>
<td>AP</td>
<td>Authorized Persons</td>
</tr>
<tr>
<td>RSE</td>
<td>Registered Structural Engineers</td>
</tr>
<tr>
<td>RGE</td>
<td>Registered Geotechnical Engineers</td>
</tr>
<tr>
<td>BCA</td>
<td>Building &amp; Construction Authority</td>
</tr>
<tr>
<td>BIM</td>
<td>Building Information Modelling</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Drafting</td>
</tr>
<tr>
<td>CSWP</td>
<td>CAD Standard for Works Projects</td>
</tr>
<tr>
<td>IFC</td>
<td>Industry Foundation Classes</td>
</tr>
<tr>
<td>GBP</td>
<td>General Building Plan</td>
</tr>
<tr>
<td>PNAP</td>
<td>Practice Notes for Authorized Persons</td>
</tr>
<tr>
<td>G.F.A.</td>
<td>Gross Floor Area</td>
</tr>
<tr>
<td>U.F.A.</td>
<td>Usable Floor Area</td>
</tr>
<tr>
<td>S.C.</td>
<td>Site Coverage</td>
</tr>
<tr>
<td>O.S.</td>
<td>Open Space</td>
</tr>
<tr>
<td>P.R.</td>
<td>Plot Ratio</td>
</tr>
</tbody>
</table>

The requirements in this document is expressed in sentences in which the principal auxiliary verb is “shall”. Recommendations are expressed in sentences in which the principal auxiliary verb is “should”. The use of the auxiliary verb “can” indicates that something is technically possible and the auxiliary verb “may” indicates permission.

Bold & Italic refers to specific Autodesk Revit terminology.

Other BIM platforms may use different terminology.
1 Introduction

The benefits of using Building Information Modelling (BIM)

BIM technology can produce a three dimensional model that can be utilized for code compliance checking (or may be for approval). The current Hong Kong practice focuses on paper based format for statutory and legal reasons. This study concentrates on using BIM technology to produce paper drawings and calculations for statutory submission purpose.

Promotion of the BIM technology

To promote the BIM technology in construction works projects, the committee on environment, innovation and technology of Construction Industry Council (CIC) set up a working group to define the roadmap for BIM Implementation in the construction industry of Hong Kong.

After a series of meetings and discussions among the working group members, two key tasks were identified:

a) To devise a set of standards or specifications for the use of BIM in construction projects to facilitate those users who wish to widen the usage of BIM.

b) To carry out more promotional activities targeting those industry stakeholders who either are not familiar with the usage and benefits of BIM or are observers or beginners for the adoption of BIM.

The CIC has decided to commission a consultancy study for the Preparation of BIM Standards for General Building Plans (GBP) Submission to Buildings Department, setting principles and methodology for other statutory authorities and concerned departments to follow in future. The techniques of using BIM for GBP Submission can also be applied to submissions for other concerned departments.

The role of A.C.I.D.

A.C.I.D. has been awarded the tasks of a consultant to prepare the BIM Standard, to organize forum among statutory authorities, institutes or other major private corporations, and to ensure the whole process will be fully understood and adopted by the industry.

Software Platform

This report does not mandate any specific BIM platform. Generic or open source IFC terminology is used throughout, except at where illustrations, diagrams and workflow demonstration are needed, Autodesk's Revit is used. To achieve the same outcome using other BIM platforms, readers should request their particular software vendor for assistance.
2 Background

Objective

It is understood that BIM technology can produce a three-dimensional model that can be utilized for code compliance checking (or may be approval), the current Hong Kong practice for the time being focuses on paper based format for statutory and legal reasons; however, this study concentrates on using BIM technology to produce paper drawings and calculations for statutory submission purpose.

The objective of this consultancy (Phase One) is to prepare a standard to utilize the advantage of Building Information Modelling (BIM) to streamline the process of submission of General Building Plans (GBP) for the new development instead of the submission of alteration and additional works to relevant statutory authorities and concerned departments.

The purpose of this phase one standards aims not to propose for a replacement or substitution of the existing practice from the statutory authorities’ and the concerned departments, but to provide an alternative method to help the industry to have a quick method to quality check their submission via BIM technology before making a formal submission. It aims to reduce time needed in quality check by manual and to avoid disapproval due to computational error (if any).

The information provided in this report is for general reference only. A report user who wishes to develop computation solutions to comply with the relevant statutory requirements should consult Authorized Person or relevant professional.

It is IMPORTANT to note that this report does not aim to and must not be deemed to exhaustively list out, redefine, interpret or replace any ordinances or regulations. This report aims to specify standard BIM tools and format to be used for presenting a certain set of required information for electronic submission to relevant departments. Any attempts to list out ordinance requirements found in this report are either directly extracted or summarised from commonly referred relevant requirements under the BO and subsidiary regulations, Code of Practice, PNAP etc. and should be deemed non-comprehensive.
2.1 Deliverables

The time frame and deliverables are outlined below:

<table>
<thead>
<tr>
<th>Task</th>
<th>Project Deliverables</th>
<th>Month After the Contract Commencement</th>
<th>Percentage of Task to Overall Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I)</td>
<td>Consultancy Status and Study Report</td>
<td>Inception Report, Progress Report, Final Report</td>
<td>2 Weeks, Monthly, 8th Month</td>
</tr>
<tr>
<td>(II)</td>
<td>Conduct Stakeholders’ Engagement Forums</td>
<td>Stakeholders Engagement Forums</td>
<td>1st Month</td>
</tr>
<tr>
<td>(III)</td>
<td>Provision of Updated Standards</td>
<td>Draft Standards, Final Standards, Update to Standards</td>
<td>4th Month, 6th Month, &lt; 6 months after acceptance of Final Standards</td>
</tr>
<tr>
<td>(IV)</td>
<td>Provision of Train-the-Trainer Trainings and Technical Briefing</td>
<td>Technical Trainings</td>
<td>7th Month</td>
</tr>
</tbody>
</table>

Total 100%
2.2 Scope of Consultancy Services

ACID are required to review the requirements under the Buildings Ordinance and its subsidiary regulations, relevant Codes of Practice and Practice Notes issued by Buildings Department, Planning Department, and Lands Department to prepare the standards aiming to develop a computational solution which facilitates semi-automatic or automatic (preferably) checking of the following items:

a. Fundamental Checking Equivalent to the Standards as per Current Practice Notes
   - Checking of file drawn in true size
   - Checking of all dimensions and areas in true figures;
   - Checking of area type in valid name, e.g. ARC08240 – non-domestic area.

b. Checking of Gross Floor Area (i.e. Site Coverage and Plot Ratio)
   - Checking of Gross Floor Area, non-Gross Floor Area, site coverage and plot ratio;
   - Checking of Gross Floor Area, non-Gross Floor Area, site coverage and plot ratio, with consideration of bonus Gross Floor Area and site coverage;
   - Separate checking to be provided according to requirements from Buildings Department, Planning Department, and Lands Department.

c. Checking of Means of Escape
   - Checking of Usable Floor Area;
   - Checking of number and width of exit routes and doors provided;
   - Checking of number of people, required number and width of exit routes and doors.

d. Checking of Sanitary Fitment Provision
   - Checking of Usable Floor Space;
   - Checking of sanitary fitment provision provided;
   - Checking of number of male and female persons, and required number of sanitary fitments.

e. Checking of Fire Compartment and Fire Resisting Construction
   - Checking of actual fire compartment area and volume;
   - Checking of requirements on fire resisting rating and elements of construction.
3 Statutory Submission Drawings

BIM is a Purpose-Driven tool while every element was based on a purpose. The following section will explain the workflow and logic on how each item for General Building Plan Submission on the list below shall be created in a flow of BIM Technology.

3.1 BIM Workflow

The BIM Workflow basically separate into 3 parts:

1. Drawings - Set up specific views on sheet such as plan, section, elevation etc.
2. Data extraction - Create area plans and rooms for calculation purposes.
3. Calculation - Use schedules to calculate the technical specifications such as Sanitary Fitment Provision, Occupancy, Means of escape requirements etc.
3.2 Drawing Graphics

A federated BIM model had to be collaborated by different parties, such as Architectural, Structural, Mechanical etc. They have to communicate and collaborate through meetings and adjust their own respective BIM model.

![Diagram of BIM model process]

**Figure 3-2. Multiple presentations for single federated BIM model**

A federated BIM model can produce various deliverables such as Government Submission, Sunlight Analysis, Geotechnical Analysis, Geographic Analysis & Energy Analysis etc. A good practice in BIM industry is to produce submission by separating into model file and drawing file due to most of the BIM software have their limitation on file size, and it should refer to the software official recommendation. For example Revit is limited to 200Mb. Each submission should create a stand-alone drawing file. Also, it should be noted that BIM implementation is a process rather than a final product. It is a misconception that a 100% completed BIM model is required before producing any deliverable.

In the GBP Submission process, there is a certain requirement about the colour indication. In the Practice Notes for Authorized Persons (PNAP) ADM-9, it is mentioned that every plan submitted for approval should be coloured in order to clearly differentiate existing works from proposed new works and one part of any proposed new works from...
For consistency in the use of colour, the preferred colours as shown in Appendix A should be adopted. For amendments to the approved works, the proposed amendments should be coloured so that they can be identified from the approved works.

Thus, the BIM model will be linked into the related Submission Drawing file. The materials can be shown in every view and plan. The RGB System in Appendix A is to provide a table of required colour on plan.

### 3.2.1 View Settings

By creating the View Templates in the BIM model, it would allow us to set different colour, line weight, view range, specific content to be shown or hidden on sheet, etc. to serve different drawing purposes such as Plan, Section, Elevation, EVA, GFA, UFA Diagram.

A systematic naming approach for View Templates will provide us an easy access to different views efficiently.

**Naming System Sample**

S\_100\_Elevation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Scale</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit</td>
<td>100</td>
<td>Plan</td>
</tr>
</tbody>
</table>

![View setting and dialogue box](image)

*Figure 3-3. View setting and dialogue box*
Figure 3-4. Typical plan view

Figure 3-5. EVA plan view
Figure 3-6. UFA Diagram view

Figure 3-7. GFA Diagram view
Figure 3-8. Sample Title Block from PNAP ADM-19. Information can also be extracted from model and presented as title block format.
Table 3-9. PNAP ADM-9 requires preferred colouring for GBP which can be pre-set in View Setting.

<table>
<thead>
<tr>
<th>Material / Description</th>
<th>Preferred Colour</th>
<th>RGB Colour System</th>
<th>Equivalent AutoCAD Colour Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardcore or Dry Fill</td>
<td>Putty</td>
<td>204, 178, 102</td>
<td>43</td>
</tr>
<tr>
<td>Brick</td>
<td>Orange Red</td>
<td>255, 63, 0</td>
<td>20</td>
</tr>
<tr>
<td>Concrete Slab (Lighter Wash)</td>
<td>Witch Haze</td>
<td>223, 255, 127</td>
<td>61</td>
</tr>
<tr>
<td>Concrete (Plain or Reinforced)</td>
<td>British Racing Green</td>
<td>0, 76, 38</td>
<td>118</td>
</tr>
<tr>
<td>Solid Concrete Blocks</td>
<td>Electric Blue</td>
<td>127, 223, 255</td>
<td>141</td>
</tr>
<tr>
<td>Hollow Concrete Blocks</td>
<td>Purple</td>
<td>191, 127, 255</td>
<td>191</td>
</tr>
<tr>
<td>Lightweight Partition (e.g. Plasterboard)</td>
<td>Macaroni and Cheese</td>
<td>255, 191, 127</td>
<td>31</td>
</tr>
<tr>
<td>Plaster or Cement Rendering</td>
<td>Wild Willow</td>
<td>204, 204, 102</td>
<td>53</td>
</tr>
<tr>
<td>Impermeable / Non-absorbent Floor or Wall</td>
<td>Neon Pink</td>
<td>255, 127, 223</td>
<td>221</td>
</tr>
<tr>
<td>Glass</td>
<td>Electric Blue</td>
<td>127, 255, 255</td>
<td>131</td>
</tr>
<tr>
<td>Timber</td>
<td>Muesli</td>
<td>153, 133, 76</td>
<td>45</td>
</tr>
<tr>
<td>Metal Work or Steel</td>
<td>Heliotrope</td>
<td>223, 127, 255</td>
<td>201</td>
</tr>
<tr>
<td>Stone Finish</td>
<td>Dark Grey</td>
<td>173, 173, 173</td>
<td>253</td>
</tr>
<tr>
<td>Sanitary Fittings</td>
<td>Yellow</td>
<td>255, 255, 0</td>
<td>50</td>
</tr>
</tbody>
</table>

1. Colours are constructed from the combination of the red, green and blue colours.
2. Plot screening setting should be 100 (i.e. full colour intensity).
3.3 Data Extraction

3.3.1 Creation of Area Diagrams in Drawing Sheet
Once area diagrams are ready, there will be one more step to further produce a proper submission drawing. The area diagrams should be gathered and drag into a drawing sheet accompanied with the results in schedule to indicate the room areas. A set of drawing can be named and reviewed according to the drawing numbers.

![Figure 3-10. Typical area diagram drawing](image)

3.4 Computational Logic for Calculations
In the General Building Plan submission, all calculations are fundamentally based on 2 elements:

1. Area
2. Classification of that area

For example the concerned areas are including:

1. Site Area
2. Gross Floor Area
3. Usable Floor Area
4. Site Coverage Area

Buildings Department’s PNAP ADM-19 highlights the requirements of the areas as defined for the purpose of the calculations. It requires the outline of the area concerned, classification of the area, identification code of the area and dimensions.
Figure 3-11. Example of Dimension Style in PNAP ADM-19 for area diagram

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC08240</td>
<td>Non-domestic area Layer</td>
<td>For outline of non-domestic GFA layer.</td>
</tr>
<tr>
<td>ARC08244</td>
<td>Non-domestic area to be deducted from area calculations</td>
<td>For non-domestic area to be deducted from the outline of non-domestic area layers under the Buildings Ordinance.</td>
</tr>
<tr>
<td>ARC08246</td>
<td>Non-domestic area to be deducted from area calculations</td>
<td>For non-domestic area to be deducted from the outline of non-domestic area layers under the Planning Department requirements.</td>
</tr>
<tr>
<td>ARC08250</td>
<td>Domestic area Layer</td>
<td>For outline of domestic GFA layer.</td>
</tr>
<tr>
<td>ARC08254</td>
<td>Domestic area to be deducted from area calculations</td>
<td>For domestic area to be deducted from the outline of domestic area layers under the Buildings Ordinance.</td>
</tr>
</tbody>
</table>

Figure 3-12. Example of Identification Code (CSWP convention) for area diagrams as required in PNAP ADM-19
3.4.1 Fundamental Checking as per Current Practice Notes

Figure 3-13. 4 fundamental checking by BD for current electronic submission

The fundamental checking system in Buildings Department for CAD drawing submission can basically separate into 4 parts:

1. Checking the unit if it is in mm.
2. Checking the dimensions if they are true or manually insert figures.
3. Checking if all area layers are closed polyline.
4. Check if there are no overlapping of areas in authoring tools and to avoid repeatedly counting one area multiple times in the drawing files.

For BIM drawing submission:

1. The software data detection already pre-set the drawing unit in mm.
2. The dimension cannot be manually altered when the software detects the input figures is numeric.
3. In order to create an Area Plan or a Room to generate area in the software, the “Area Plan” must be a closed area boundary and the “Room” is already pre-set as a closed object.
4. The software would not allow the area plan overlap with each other in single view.

Therefore, we can avoid the checking procedure for the unit, true dimension, closed polyline and overlapping of areas.
Figure 3-14. Dimension cannot be manually altered when the software detects the input figures is numeric in Autodesk Revit
3.4.2 Checking of Site Coverage and Plot Ratio

Figure 3-15. Flowchart for deriving relevant information for site coverage and plot ratio
Site Coverage and Plot Ratio Calculations

Development Intensity is generally measured by building bulk, quantified as site coverage and plot ratio.

Site coverage means the area of the site that is covered by the building that is erected thereon and, when used in relation to a part of a composite building, means the area of the site on which the building is erected that is covered by that part of the building. (see Cap123F Regulation 2)

The plot ratio of a building shall be obtained by dividing the gross floor area of the building by the area of the site on which the building is erected. (see Cap123F regulation 21)

The permitted site coverage and plot ratio for a building to be erected on a site is determined according to the class of the site, which in turn depends on the number of streets not less than 4.5m wide that the site abuts. (see PNAP APP-124)

The derived permissible and actual provision should be presented, as a general practice, in form of a set of calculations, as below as an example:
Figure 3-17. Example presentation format from PNAP ADV-33

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

Site Area (Accountable for P.R & S.C.)
- Demarcate the boundary for site area for the purpose of plot ratio and site coverage calculations.
- Extract the area from model.

Permissible Information
1. Class of Site
   Insert Class “A”, “B” or “C” as determined by AP

2. Permitted domestic site coverage (over 61m)
   - Use Class of Site to lookup Cap123F First Schedule

3. Permitted non-domestic site coverage (over 61m)
   - Use Class of Site to lookup Cap123F First Schedule

4. Permitted non-domestic plot ratio (BPR)
   - Use Class of Site to lookup Cap123F First Schedule

5. Permitted domestic lot ratio (BPR)
   - Use Class of Site to lookup Cap123F First Schedule

6. Permitted plot ratio (OZP)
   - Determined by AP, usually by looking up relevant statutory Outline Zoning Plan.
Actual Provision Information

1. Actual Domestic GFA (also applicable to actual non-domestic GFA)
   - Derived from total domestic GFA outline area - total domestic GFA concession area. Each has its own subset of calculations
     o Demarcate Domestic GFA outline by as “Zone” (as defined in BS 1192-4:2014), usually by floors.
     o Demarcate GFA concession areas as “Zone” by floors. GFA concession areas comprise of 4 types of areas, namely disregarded GFA, Amenity feature, JPN1 & JPN2. (GFA concession list extracted from PNAP ADM-2)
       4 types of GFA concession areas may exist as “Space” or “Zone” or “Floor”, depending on their nature.

2. Actual Domestic Plot Ratio (also applicable to actual non-domestic plot ratio)
   - Derived from Actual domestic GFA divided by Site Area

3. Checking of overall Plot ratio not exceeded
   - If the site contains domestic and non-domestic parts, then:
     Actual domestic PR <= (permitted non-domestic PR – Actual non-domestic PR) x permitted domestic PR / permitted non-domestic PR

4. Actual Site Coverage
   - Demarcate the boundary of site coverage outline and extract area.
   - Derived from site coverage area divided by Site Area.

3.4.2.1 Example of Autodesk Revit Operation for Checking the Area of GFA

By means of creating a proper GFA diagram for calculation, there will be a few steps to be followed. First, we have to create two sets of **Area Plan**, one is for GFA Outline and the other is GFA Concession. Afterwards, underlay a half-toned floor plan to indicate the location of area to be created later to enhance the accuracy of area. The AP has to determine which part is the GFA Outline., which part of the floor is the GFA concession.

In each set of **Area Plan**, create outline of the area. Overlapping both accountable GFA outline and GFA concession area plan can indicate both areas on the same view.
Figure 3-18. Area Plan – Overlap 2 Area Plans on same view

Figure 3-19. Area Outline with different CSWP convention identification code
3.4.3 Checking of Means of Escape

Figure 3-20. Flowchart for deriving relevant information for means of escape
Provisions of Exit Doors & Exit Routes from Room, Fire Compartment or Storey

Every building, except those buildings permitted under Clause B6.1 to have only one required staircase, should be so constructed that there are available from each storey not less than 2 exit routes or such greater number as may be required by Table B2. The width of each exit route and the total width of all the exit routes should be not less than the width shown in Table B2 according to the occupant capacity and the number of exit routes provided. Provided that:

(a) This requirement should apply to only one of the storeys of a maisonette; and
(b) Where two or more exit routes (required by Table B2 to serve a storey) vary in width, any width of an exit route in such group in excess of 50% above the width of the narrowest exit route in such group should not be included in the calculation for the minimum total width of exit routes as required by column 4 of Table B2.


![Table B2](image)

**Figure 3-21. FS Code 2011 Table B2**

As a guide to assessing the requirements on means of escape, the following Table B1 should be used as the basis for calculating the occupant capacity of a building or part of a building.

(refer FS Code 2011 Clause B4.1)
The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

| PROVISIONS OF EXIT DOORS & EXIT ROUTES FROM ROOM, FIRE COMPARTMENT OR STOREY |
|---|---|---|---|---|---|---|---|---|
| Location | Exit | Total No. of Exit Doors | Exit Width | Exit Area | Exit Length | Exit Size | Exit Accessible | Exit Useful |
| Required | Provided | Required | Provided | Required | Provided | Required | Provided | Required |

The logic of deriving the information (i.e. requirement and related project information) for the fields in the table is illustrated in the above flowchart, as described below:

1. **Location:**
   - Demarcate the relevant proposed rooms, fire compartment or storeys as “Space”, “Zone” or “Floor” respectively (as defined in BS 1192-4:2014) and use common names as identification names for easy identification.
   - Insert “Space” / “Floor” location into the field.

2. **Use:**
   - Insert “Space” / “Zone” / “Floor” identification name.

3. **Use Classification:**
   - Classify each “Space” / “Zone” / “Floor” according to FS Code 2011 Table B1.

4. **Total Usable Floor Area (m2):**
   - Extract floor area of concerned “Space” / “Zone” / “Floor”.

---

**Figure 3-22. FS Code 2011 Table B1**
5. **Occupancy Factor (usable floor area in m2 per person)**
   - Derive by looking up FS code 2011 Table B1 for respective use classifications.

6. **Total Capacity of Room, fire compartment or Storey**
   - Total Usable Floor Area x Occupancy Factor.

7. **Minimum number and width of exit doors and exit routes from a room, fire compartment or storey**
   - Derive using Total capacity of Room or storey by looking up FS Code 2011 Table B2.

3.4.3.1 **Example of Autodesk Revit Operation for Checking the Area of UFA**

An example will be illustrated the workflow of UFA calculation process. By using the **Room** tool to find out the room area. Then classify the use of the area and check the relevant Code of Practice.

![Figure 3-23. Automatic demarcation of room area by using Room tool](image)
3.4.4 Checking of Sanitary Fitment Provision

Figure 3-24. Flowchart for deriving relevant information for provision of sanitary fitment
The Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations ("the Regulations" in this section) stipulate the drainage requirements for private buildings in Hong Kong. Such requirements, inter alia, include the provisions of sanitary fitments for various types of premises.

The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

<table>
<thead>
<tr>
<th>LOCATION OF FLOOR</th>
<th>USE</th>
<th>TOTAL Usable Floor Area</th>
<th>Factor representing m² of usable floor area per person</th>
<th>Total number or person of the location or floor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

1. **Location or Floor:**
   - Identify and demarcate the location or floor as “zone” or “floor” (as defined in BS 1192-4:2014) respectively for the purpose of this calculation.
   - Insert the location into the field.

2. **Use:**
   - To classify the location or floor (“zone” or “floor”) into different uses for that part of building, according to Regulations 4-8, which are:
     - Residential Buildings
     - Workplaces
     - Places of public entertainment
     - Sports stadia
     - Cinemas
     - Shopping arcade and department stores
     - Religious institutions
     - Funeral parlours
     - Restaurants

3. **Total Usable Floor Area:**
   - Extract and insert floor area of concerned “Zone” or “Floor”.

4. **Factor representing m² of usable floor area per person**
   - Obtain the factor by looking up respective Regulations 4-8.

5. **Total number or person of the location or floor**
   - Equals total usable floor area divided by factor.
6. **Number of male person and female person**
   - To determine the number of male persons and female persons for that part of building according to the “proportion” as stated in the respective Regulations 4-8.

7. **Sanitary fitment required**
   - To calculate the required number of provisions for sanitary fitments according the rate stated in the respective Regulations 4-8 for male and female. These sanitary fitments include:
     - Watercloset fitments
     - Urinals
     - Lavatory basins
     - Baths or showers

8. **Sanitary Fitment provided**
   - Obtain the total number of sanitary fitments of the concerned “zone” or “floor”.
3.4.5 Checking of Fire Compartment and Fire Resisting Construction

Figure 3-25. Flowchart for deriving relevant information for fire compartmentation and fire resisting construction
Fire compartmentation and Fire Resistance requirement for Elements of Construction

Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 (Code of Practice for Fire Safety in Buildings 2011, “FS Code 2011” in this section) in order to inhibit the spread of fire. (FS Code 2011 Clause C3.1)

Every element of construction within each fire compartment and every fire barrier of each fire compartment should have an FRR of not less than that as specified in Table C1. (FS Code 2011 Clause C4.1)

FS Code 2011 Table C1 is extracted here for easy reference:

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Compartment Area/Volume</th>
<th>Fire Resistance Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>2. Hotel and similar Transient Accommodation</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4. Commercial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Business Facilities</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4b. Mercantile Facilities</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>5. Assembly:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5a &amp; 5d PPE &amp; Other assembly premises</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>5b. Educational establishments</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>5c. Transport facilities</td>
<td>Not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>6. Industrial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a. Industrial workplaces</td>
<td>Not exceeding 10,600m²</td>
<td>120</td>
</tr>
<tr>
<td>6b. Bulk storage, Warehouses</td>
<td>Not exceeding 28,000m³ and 10,500m³</td>
<td>120</td>
</tr>
<tr>
<td>6c. Storage, manufacturing of hazardous/dangerous goods premises</td>
<td>Not exceeding 7,000m³</td>
<td>120</td>
</tr>
<tr>
<td>7. Carparks</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
</tbody>
</table>

*Figure 3-26. FS Code 2011 Table C1*
The derived required provision should be presented, as a general practice, in form of the table, as below as an example:

<table>
<thead>
<tr>
<th>FIRE RESISTANCE REQUIREMENT FOR ELEMENTS OF CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The logic of deriving the information (i.e. requirement and related project information) for the following fields in the table is illustrated in the above flowchart, as described below:

1. **Location:**
   - Demarcate the proposed fire compartmentation into “Zones” (as defined in BS 1192-4:2014) and use common names as identification names for easy identification.
   - Insert “Zone” location into the field.

2. **Type of Accommodation:**
   - Insert “Zone” identification name.

3. **Use Classification:**
   - Classify each “Zone” according to FS Code 2011 Table C1.

4. **Maximum permissible Compartment of (part of) building by floor area or volume**
   - Derive by looking up FS code 2011 Table C1 for respective use classifications.

5. **Actual compartment of (part of) building by floor area or volume**
   - Extract floor area or volume of each “zone” and compare against the maximum permissible compartment of (part of) building by floor area or volume.

6. **Minimum Fire Resistance Rating (FRR)**
   - Derive by looking up FS code 2011 Table C1 for respective use classifications.

7. **The FRR of the standard of construction and building materials**
   - Derive by looking up the following tables of FS code 2011:
     a. Table E2 on Walls Constructed Wholly of Non-combustible Materials.
     b. Table E3 on Walls not Constructed Wholly of Non-combustible Materials Table E4 on Floors and Landings.
     c. Table E5 on Steel Columns and Beams.
     d. Table E6 on Reinforced Concrete Columns and Beams.
     e. Table E7 on Stairs.
3.5 Semi-Automatic vs. Automatic Calculations

Whereas the semi-automatic process involves the summation of concerned area plan, due to limited data manipulation functionality in the most commonly used BIM authoring tools, the look up tables process is still commonly done outside the authoring tools, usually manually.

Automatic calculations refer to a script or plug-in which will automatically refer to the statutory tables and perform the calculation, returns with a result and fill in the requirement schedule. This is, however, belongs to another phase of the Consultancy Study which will not be covered here.

Figure 3-27. Possible automation for GBP workflow and components
4 Proposed additional Requirements for Electronic Submission for Mathematical Calculation of Areas by BIM Platforms (based on PNAP ADM-19 Appendix F)

It is realised that BIM authoring software is much more sophisticated than CAD software. BIM authoring software generally require higher hardware and software costs, much more upfront training of staff on the BIM concept and actual operation knowledge. The process could take consideration time and effort, which would delay and hinder the adoption schedule. Therefore, we propose a two stage adoption of BIM submission on the approver side.

4.1 Stage 1: Model viewing only
For model and drawing viewing purpose, such as identifying areas alignments and 3D geometry viewing, approver may accept BIM model to be exported to their native viewer format. For example, BIM model drawn using Autodesk Revit may be exported to .DWFx format, which can be viewed on free Autodesk Design Review;

Graphisoft ArchiCAD can be exported to .BIMx format, which can be viewed on free BIMx App on Android’s or iOS devices.

BIM viewers are usually light weight, user friendly and have much shallower learning curve. The training time and effort should be much smaller and approvers can pick up and adopt within a short period of time.

This stage is about passive application of BIM models. This stage should act as a grace period for approvers and industry to cultivate BIM submission workflow.

4.2 Stage 2: Model information extraction
In this stage, native BIM format should be accepted.

There are two targets to be achieved:

1. Reduce the industry efforts needed for BIM submissions.
   According to Singapore BCA’s experience as stated in their latest circular letter ref. APPBCA-2016-10 dated 19 October 2016, their local industry feedback “about the extra efforts required to reinstate annotations that are lost during the compression of the Native BIM file to lightweight file format.” BCA addressed this feedback by “accept voluntary BIM e- submissions in Native BIM format.”

   (refer: https://www.corenet.gov.sg/media/2032998/circular-on-bim-e-submission-for-plan-submission-to-bca.pdf)

2. This stage is about active application of BIM models.

It is known that an adequately prepared BIM models contain tons of information about the concerned building developments. Some of this information are public infrastructure related. Such information should be systematically incorporated into government’s current system such as Lands Department mapping system and made easily accessible to government departments and public.
Buildings department or Lands Department, being the frontline departments in handling private developments, could be a window to accept BIM native model, request specific set of information organised in a specific data structure, for further incorporating into government’s system.

### 4.3 Proposed Appendix

The following is a proposed additional appendix to current PNAP ADM-19 for stage 1 BIM adoption for accepting electronic submission of area calculations prepared by BIM software. The entire proposal is based on current appendix F of same PNAP with proposed modification underlined and marked in red.

**Proposal:**

The purpose of this supplementary note is to advise on the electronic format and the pre-requisites for checking of area calculations in BIM drawing files electronically.

2. When the requirements set out in the following paragraphs are complied with and clearly shown in the submitted BIM drawing files, diagrammatic breakdowns and details on calculation of the gross floor area, usable floor area, site coverage, plot ratio, refuge floor area and green feature area etc. would not be required to be included in plan submission. For avoidance of doubt, annotation and dimension of the areas concerned are required to be indicated on plans for checking purpose. Samples of the dimensioned plans are in Annex 1 for reference.

3. For area calculations computed electronically, soft copies of the building floor plans containing the area diagram layer(s) / “CSWP Convention” parameter are required to facilitate verification of the calculations. For approval purpose, hard copies of the general building plans showing floor area layouts, area diagrams and calculations without breakdowns are required. Information shown in both the soft and hard copies of the plans submitted for approval must be identical to each other. Plans may be rejected if discrepancy between the two is found. The AP should certify on each of the DVD-ROM discs with a permanent marker signifying that information in the electronic drawing files are identical to the submitted hard copies and that all files are prepared under his supervision. The disc should be finalised before submission, i.e. the contents of the disc cannot be further changed. His signature shall be deemed to be his assumption of responsibility for the electronic plans and the calculations.

4. The following minimum requirements in BIM drawing format should be observed and provided for in the area calculations computed electronically. Plans may be rejected on grounds of insufficient information if these requirements are not complied with.

#### 4.1 Format and Software Version

(a) The submitted BIM drawing files should be stored in non-rewritable DVD-ROM discs. Except otherwise agreed by the Building Authority all other electronic submission formats are not acceptable.

(b) **BIM files should be exported to lightweight “.dwf” or “.dwfx” viewer format** All other compressed or zipped file formats are not acceptable.

(c) Title blocks completed with drawing number showing revision legends, site/project title, drawing title etc. should be inserted in every drawing for identification.
purpose. Each BIM lightweight file shall contain all hard copy drawing. Typical title block sample is attached in Annex 2 for reference.

4.2 Referencing System

File Name/Drawing Number Convention

(a) Each file shall either contain full set of drawings or one drawing only, default zoomed to full drawing extent.

(b) All information for approval shall be contained in the same drawing file. The need to cross-reference or hyper-link with another BIM file to enable verification of the area calculations in the DVD-ROM is not acceptable except in situation covered in (c) below.

(c) In situation where the layering number, “CSWP Convention” parameter number and the system are limited due to software constraint, limited referencing system might be used provided that all information and BIM model files which compose the final drawings are clearly visible and intact when files are open in the computer. A clear and systematic path trial in hard copy format highlighting the list of file(s) for area checking purpose should be provided to facilitate the verification exercise. All drawing files and model files are to put into the same folder to ensure coherent path recognition. Cross-referencing and hyper-linking within folder should be kept to the minimum.

(d) Naming and numbering of drawing files in the hard copy should be identical to those in the submitted soft copy.

(e) A completed hard and soft copy of the drawing index listing all file names, drawing numbers with brief description on location and contents of the submitted drawings shall be provided. Drawings under different revision must carry a revision letter (e.g. A to Z) for identification purpose. For large and complicated project involving numerous drawing versions/amendments, a revision legend should also be provided as well.

Layering / Area Plan Organization

(a) BIM drawings files including floor plans, tables and calculations etc. shall contain all information identical to the hard copy. Each file shall accommodate different elements such as floor layout plans, usable floor area, gross floor area and dimension etc. into the relevant layers. The “layering” drafting technique isolates elements of a drawing and places them into separate layers for easy reference and manipulation. In BIM software without layer function, (e.g. Revit), “area plan / room” tools should be used for further “visibility control” for isolation and easy reference and manipulation.

(b) To facilitate checking of the area calculations, general building plans shall contain GFA and other areas diagram layers or area boundary diagram for verification and calculations. To reconcile the requirements of other government deparths and to adopt the rules under BIM Standards for Works Projects (CSWP) of Environment, Transport and Works Bureau, AP shall name the relevant layers or custom created.
“CSWP Convention” parameter for each area boundary for BIM software without layer function, (e.g. Revit) in a format specified below:

Layer / “CSWP Convention” parameter Name Convention

Diagram A: Rules of Layer / “CSWP Convention” Parameter Name Convention of CSWP (abstracted)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Length/Type</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agent Responsible Code</td>
<td>3 (alphanumeric)</td>
<td>See <a href="http://www.ctwb.gov.hk/cswp">www.ctwb.gov.hk/cswp</a></td>
</tr>
<tr>
<td>2</td>
<td>CSWP Element Code assigned for Building Plan Area Calculation (Class)</td>
<td>3 (numeric)</td>
<td>a) 082 for BD’s area calculation, b) 086 for LandsD’s area calculation</td>
</tr>
<tr>
<td></td>
<td>Building Plan Area Type (Sub-class)</td>
<td>1 (numeric)</td>
<td>See Diagram B</td>
</tr>
<tr>
<td>3</td>
<td>Addition/Deduction Type</td>
<td>1 (alphanumeric)</td>
<td>See Diagram C</td>
</tr>
</tbody>
</table>
### Diagram B

<table>
<thead>
<tr>
<th>Code</th>
<th>Building Plan Area Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site Coverage (SC) – Non-domestic</td>
</tr>
<tr>
<td>2</td>
<td>Site Coverage (SC) – Domestic</td>
</tr>
<tr>
<td>4</td>
<td>Gross Floor Area (GFA) – Non-domestic</td>
</tr>
<tr>
<td>5</td>
<td>Gross Floor Area (GFA) – Domestic</td>
</tr>
<tr>
<td>9</td>
<td>Usable Floor Area (UFA)</td>
</tr>
<tr>
<td>0</td>
<td>Open Space (OS)</td>
</tr>
<tr>
<td></td>
<td>Elements common to all area type</td>
</tr>
</tbody>
</table>

### Diagram C

<table>
<thead>
<tr>
<th>Code</th>
<th>Addition/Deduction Type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Base Area</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Deduction Area</td>
<td>For area to be deducted from the outline of area layers /<em>CSWP Convention</em> Parameter under the Buildings Ordinance.</td>
</tr>
<tr>
<td>5</td>
<td>Deduction Area</td>
<td>For area to be deducted from the outline of area layers /<em>CSWP Convention</em> Parameter under the Lands Department requirement.</td>
</tr>
<tr>
<td>6</td>
<td>Deduction Area</td>
<td>For area to be deducted from the outline of area layers /<em>CSWP Convention</em> Parameter under the Planning Department requirement.</td>
</tr>
<tr>
<td>8</td>
<td>Dimension</td>
<td></td>
</tr>
</tbody>
</table>
Diagram D: Layer / “CSWP Convention” Parameter Names generated from the above rules for this PNAP

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC08240</td>
<td>Non-domestic area</td>
<td>For outline of non-domestic GFA layer / “CSWP Convention” Parameter.</td>
</tr>
<tr>
<td>ARC08244</td>
<td>Non-domestic area to be deducted</td>
<td>For non-domestic area to be deducted from the outline of non-domestic</td>
</tr>
<tr>
<td></td>
<td>from area calculations</td>
<td>area layers / “CSWP Convention” Parameter under the Buildings Ordinance.</td>
</tr>
<tr>
<td>ARC08246</td>
<td>Non-domestic area to be deducted</td>
<td>For non-domestic area to be deducted from the outline of non-domestic</td>
</tr>
<tr>
<td></td>
<td>from area calculations</td>
<td>area layers / “CSWP Convention” Parameter under the Planning Department</td>
</tr>
<tr>
<td>ARC08250</td>
<td>Domestic area</td>
<td>For outline of domestic GFA layer / “CSWP Convention” Parameter.</td>
</tr>
<tr>
<td>ARC08254</td>
<td>Domestic area to be deducted</td>
<td>For domestic area to be deducted from the outline of domestic area</td>
</tr>
<tr>
<td></td>
<td>from area calculations</td>
<td>layer / “CSWP Convention” Parameter under the Buildings Ordinance.</td>
</tr>
</tbody>
</table>
(c) The Layer / "CSWP Convention" Parameter names required by LandsD are not listed in this PNAP and AP should make reference to the Practice Note issued by LandsD. AP should also refer to CSWP of Environment, Transport and Works Bureau (atwww.etwb.gov.hk/cswp) for other layer name convention.

(d) Layer / "CSWP Convention" Parameter file organization of the file(s) in hard copy format shall be submitted. If more layer / "CSWP Convention" Parameter description is required in the submitted general building plans, AP could lengthen the above list with additional input along similarly constructed methodology. All layering / "CSWP Convention" Parameter organizations must be clearly shown.
(e) **BIM** file for the floor plan shall contain all elements and information that have to be shown on the drawings to facilitate approval, including, inter alia, the area and the dimension layers. Elements such as lighting, electric appliances and the like where approval from the Building Authority is not required should not be shown in the submitted drawings.

### 4.4 Presentation Style

**Drawing Scale**

(a) **BIM** drawings should be drawn in true size with precision rounded up to the nearest mm unit.

**Drawing Object within area diagram**

(b) The position of the drawing shall be close to *project base point, survey point 0.0* and drawing objects in area diagram shall not be grouped or blocked.

*Area boundary (Area Boundaries in “Area Plans / Room” for Revit, “Zone” for Archicad)*

(c) All area boundaries for BIM drawings intended for area calculation shall be closed.

**Dimension**

(d) All dimensions should be true dimensions generated automatically by the software and laid in the specified layers / “category” (in Revit). Text figures or figures manually inserted, amended or constructed for calculation purpose in the **BIM** file is not acceptable.

**Decimal places of areas and volumes**

(e) All areas and volumes should be presented in m² and m³ units respectively and rounded up to 3 decimal places.

**Suggested Text Font**

(f) Text style is not compulsory. Conventional text fonts are suggested. Common type such as *“Arial Narrow” font in 2.5mm size* is recommended for use in the text.

**Review**

5. These guidelines will be refined taking into the experience gained. Suggestions to facilitate and/or to improve the electronic vetting procedures are always welcomed.
Common BIM Platform and Viewer

There are many viewers to view the dwf / dwfx file provided by Autodesk:

<table>
<thead>
<tr>
<th></th>
<th>dwf</th>
<th>dwfx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autodesk Design Review</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Autodesk DWF Viewer</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Autodesk Navisworks Freedom</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Sample of CSWP Naming Convention in BIM model
(Screen capture from Autodesk Design Review)

Figure 4-1. Typical Floor G.F.A. Diagram
Figure 4-2. Sample of CSWP Naming Convention in DWFX File
Figure 4-3. Sample of CSWP Naming Convention in DWFX

Annex 1. Example of Dimension Style in PNAP ADM-19 for area diagram
Annex 2. Sample Title Block from PNAP ADM-19. Information can also be extracted from model and presented as title block format
5 Stakeholders Engagement Forum

Meetings with concerned parties were held in the following meetings:

1. Stakeholder meeting No.1 (7/12/2016 at Housing Authority conference room)
2. Building Department Workshop No.1 (16/8/2016 at A.C.I.D. office)
3. HKIBIM Board Meeting (6/9/2016 at VTC office)
4. Housing Department ICU Meeting (12/9/2016 at HKHA ICU conference room)
5. Building Department Workshop No.2 (19/9/2016 at B.D. conference room)
6. Stakeholder meeting No.2 (3/10/2016 at Housing Authority conference room)
7. HKIA BIM & IT Committee Meeting (4/10/2016 at HKIA Premises)
8. Lands Department meeting (20/10/2016 at Lands Department conference room)

5.1 Opinions and Feedbacks from stakeholders

The following items have been discussed among different stakeholders:

1. Stakeholders suggested that templates based on the standard proposed in the report should be created and distributed for benefit of local building industry.
2. The contents of this report could not replace professional judgement.
3. Stakeholders were concerned on the software platforms and versions.
4. The formats of GBP presentation are flexible and vary among practices. The report should only describe the logic of deriving relevant information using BIM softwares. For example: BIM is using schedule format to show the calculation other than in formula format.
5. Increase of efficiency of plan preparation by APs and plan checking efficiency by government departments could be important incentive for adopting BIM for submission purpose.
6. The report should be further extended to include other information, such as car park calculations, to be submitted to other relevant departments.
7. BIM models contain a lot more data other than GBP related information, and it was suggested that more studies should be conducted for incorporating them into other government databases.
6 Statutory Submission Drawings

To improve the efficiency of plan processing and enhance the quality of plan submission, the Buildings Department (BD) reviews the plan approval process regularly and has implemented various measures, such as curtailed check system, pre-submission enquiry and conference services, streamlined procedures, fast track processing, etc. The general principles and details of such measures are given in the PNAP ADM-19. The PNAP ADV-33 sets out general guidance to facilitate the Authorized Persons (AP), Registered Structural Engineers (RSE) and Registered Geotechnical Engineers (RGE) in the preparation of plan submissions for various types of building works.

In this section, we are going to demonstrate the comparisons of the graphics and formats between PNAP ADV-33 and BIM drawings.
6.1 Comparisons of B.D. PNAP ADV-33 versus BIM Drawings

Figure 6-1. Site Location Plan and Notes extracted from PNAP ADV-33
Figure 6-2. Site Location Plan and Notes produced by BIM approach
Figure 6-3. Legends, Drawing List and Notes extracted from PNAP ADV-33
**Figure 6-4. Legends, Drawing List and Notes produced by BIM approach**
Figure 6-5. Typical Plan extracted from PNAP ADV-33

Figure 6-6. Typical Plan produced by BIM approach
Figure 6-7. Section extracted from PNAP ADV-33

Figure 6-8. Sections produced by BIM approach
Figure 6-9. Elevation extracted from PNAP ADV-33

Figure 6-10. Elevations produced by BIM approach
### Figure 6-11. List of GFA Concession extracted from PNAP ADV-33

<table>
<thead>
<tr>
<th>Name</th>
<th>Area (SQ M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB Room</td>
<td>23.466 m²</td>
</tr>
<tr>
<td>POTABLE &amp; FLUSHING WATER TANK TRANSFER PUMP ROOM</td>
<td>37.307 m²</td>
</tr>
<tr>
<td>ELECTRICAL ROOM</td>
<td>0.720 m²</td>
</tr>
<tr>
<td>MAIN SWITCH ROOM</td>
<td>20.494 m²</td>
</tr>
<tr>
<td>TRANSFORMER ROOM</td>
<td>26.753 m²</td>
</tr>
<tr>
<td>TRANSFORMER ROOM</td>
<td>22.440 m²</td>
</tr>
<tr>
<td>SPRINKLER PUMP RM</td>
<td>27.548 m²</td>
</tr>
<tr>
<td>ELECTRICAL ROOM</td>
<td>3.500 m²</td>
</tr>
<tr>
<td>FILTRATION PLANT ROOM</td>
<td>49.183 m²</td>
</tr>
<tr>
<td>CLEANSING WATER PUMP RM</td>
<td>19.003 m²</td>
</tr>
<tr>
<td>WATER METER RM.</td>
<td>3.500 m²</td>
</tr>
<tr>
<td>ELECT. RM.</td>
<td>2.049 m²</td>
</tr>
<tr>
<td>ELEC. RM.</td>
<td>1.457 m²</td>
</tr>
<tr>
<td>EMERGENCY GENERATOR ROOM</td>
<td>26.600 m²</td>
</tr>
<tr>
<td>NON-ESSENTIAL GENERATOR RM</td>
<td>18.745 m²</td>
</tr>
<tr>
<td>LOADING/UNLOADING</td>
<td>24.500 m²</td>
</tr>
<tr>
<td>METER ROOM</td>
<td>2.821 m²</td>
</tr>
<tr>
<td>REFUSE STORAGE MATERIAL RECOVERY CHAMBER</td>
<td>10.517 m²</td>
</tr>
<tr>
<td>METER ROOM</td>
<td>2.010 m²</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>533.284 m²</strong></td>
</tr>
</tbody>
</table>

### Figure 6-12. List of GFA Concession produced by BIM approach
### (A) GENERAL:
- SITE AREA (ACCOUNTABLE FOR P.R. & S.C.)
- CLASS OF SITE
- HEIGHT OF BUILDING
- PERMITTED DOMESTIC SITE COVERAGE (OVER 61 m²)
- PROPOSED DOMESTIC SITE COVERAGE (OVER 61 m²)
- PERMITTED NON-DOMESTIC SITE COVERAGE (UNDER 15m²)
- PERMITTED NON-DOMESTIC SITE COVERAGE (OVER 61m²)
- PROPOSED NON-DOMESTIC SITE COVERAGE (OVER 61m²)
- PERMITTED NON-DOMESTIC LOT RATIO (BPR)
- PERMITTED DOMESTIC LOT RATIO (BPR)
- PROPOSED LOT RATIO (LDR)
- PROPOSED NO. OF UNITS
- PROPOSED DOMESTIC G.F.A.
- PROPOSED NON-DOMESTIC G.F.A.

### (B) DOMESTIC G.F.A. CALCULATION:
- 5/F to 25/F
- 4/F
- 3/F
- 1/F
- GF
- TOTAL

### (C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

### (D) REMAINING NON-DOMESTIC G.F.A.:

### (E) NON-DOMESTIC G.F.A. CALCULATION:
- 5/F
- 4/F
- 3/F
- 1/F
- GF
- TOTAL

### (F) ACTUAL PLOT RATIO FOR NON-DOMESTIC:

### (G) ACTUAL TOTAL PLOT RATIO:

### (H) DOMESTIC SITE COVERAGE CALCULATION (LARGEST FL.):

### (J) NON-DOMESTIC SITE COVERAGE CALCULATION:

### (K) RECREATIONAL FACILITIES AREA CALCULATION:

### (L) REFUSE CHAMBER AREA CALCULATION:

### (M) OPEN SPACE PROVISION:

### BALCONY AREA CALCULATION

### UTILITY PLATFORM AREA CALCULATION

### LIFT SHAFT AREA DIAGRAM

### EXEMPTED AREA CALCULATION FOR LIFT SHAFT

### AREA DIAGRAM FOR REFUSE CHAMBER

### AREA CALCULATION FOR REFUSE CHAMBER

---

**Figure 6-13. Calculations extracted from PNAP ADV-33**
SITE COVERAGE & PLOT RATIO CALCULATION

(A) GENERAL:
CRUDE OIL: A
MILEAGE: 17.86
BUILDING HEIGHT: 115.0 m
PERMITTED NON-DOMESTIC GFA: 8
PERMITTED DOMESTIC GFA: 0
PERMITTED DOMESTIC PR: 0

(D) REMAINING NON-DOMESTIC GFA:
(E) NON-DOMESTIC GFA CALCULATION:
(F) ACTUAL PLOT RATIO FOR NON-DOMESTIC:
ACTUAL NON-DOMESTIC GFA: 1,980,600
ACTUAL NON-DOMESTIC PR: 1,980,600

(G) ACTUAL TOTAL PLOT RATIO:
CRUDE OIL: A
MILEAGE: 1,980,600
ACTUAL DOMESTIC GFA: 570,893
ACTUAL DOMESTIC PR: 570,893

(H) DOMESTIC SITE COVERAGE CALCULATION:
ACTUAL DOMESTIC GFA: 570,893
SITE COVERAGE CHART: 120% (A)

44311 65478 10,000

52450,198,706

(C) ACTUAL TOTAL GFA CALCULATION FOR DOMESTIC:
DOMESTIC RESIDENCES
INTERNAL DOMESTIC GFA: 540,986
INTERNAL NON-DOMESTIC GFA: 128,913

TOTAL GFA: 540,986 + 128,913

DOMESTIC LIFT SHAFT AREA: 2,730
DOMESTIC LIFT SHAFT AREA: 2730

TOTAL GFA: 565,196

(L) GFA CALCULATION:

TOTAL GFA: 565,196

UNDER OUTLINE ZONING PLAN
ZONE: A
PROPOSED USE: RESIDENTIAL
PROPOSED BUILDING HEIGHT: 16.875 m

PERMITTED BUILDING AREA: 54,000

(K) RECREATIONAL FACILITIES AREA CALCULATION

5TH RECREATIONAL FACILITIES DIAGRAM
GFA: 275,000

(N) BALCONY AREA CALCULATION

555 (2 X 555) 450,000

GREEN BALKONY AREA CALCULATION (UNIT A):

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>A</td>
<td>1,000</td>
</tr>
</tbody>
</table>

SCHEDULE OF LIFT & UPS UNIT (A) FOR LIFT:

(G) BALCONY AREA CALCULATION (UNIT B):

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>B</td>
<td>1,000</td>
</tr>
</tbody>
</table>

SCHEDULE OF LIFT & UPS UNIT (A) FOR UPS:

(G) EXEMPTED AREA CALCULATION FOR LIFT SHAFT

LIFT SHAFT SCHEDULE

(R) AREA DIAGRAM FOR REFUSE CHAMBER AREA CALCULATION FOR REFUSE CHAMBER

REFUSE STORAGE & MATERIAL RECOVERY CHAMBER AREA CALCULATION

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>REFUSE STORAGE MATERIAL RECOVERY CHAMBER</td>
<td>210.48</td>
</tr>
</tbody>
</table>

REFUSE AREA DIAGRAM

P1

Pre
Figure 6-15. GFA Diagram & Calculation extracted from PNAP ADV-33

Figure 6-16. GFA Diagram & Calculation produced by BIM approach
UFA Diagram & Calculation

Figure 6-17. UFA Diagram & Calculation extracted from PNAP ADV-33

Figure 6-18. UFA Diagram & Calculation produced by BIM approach
Figure 6-19. Compartmentation Diagram extracted from PNAP ADV-33

Figure 6-20. Compartmentation Diagram produced by BIM approach
EVA Diagram & Calculation

Figure 6-21. EVA Diagram and Calculations extracted from PNAP ADV-33

Figure 6-22. EVA Diagram and Calculations produced by BIM approach
### Figure 6-23. FRR Schedule extracted from PNAP ADV-33

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of Accommodation</th>
<th>Use Classification</th>
<th>Fire Resistance Requirement</th>
<th>Use</th>
<th>Subject to</th>
<th>Total</th>
<th>Total</th>
<th>Use</th>
<th>Subject to</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

**Figure 6-24. FRR Schedule produced by BIM approach**
### Figure 6-25. Provisions of Exit Doors and Routes Schedule extracted from PNAP ADV-33

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>FLOOR</th>
<th>TOTAL NO. OF EXIT ROUTE</th>
<th>MIN. TOTAL WIDTH OF EXIT ROUTE</th>
<th>MIN. WIDTH OF EACH EXIT DOOR</th>
<th>MIN. WIDTH OF EACH EXIT ROUTE</th>
</tr>
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<tbody>
<tr>
<td>1FL</td>
<td>2</td>
<td>2</td>
<td>150</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>2FL</td>
<td>2</td>
<td>2</td>
<td>150</td>
<td>120</td>
<td>180</td>
</tr>
</tbody>
</table>

### Figure 6-26. Provisions of Exit Doors and Routes Schedule produced by BIM approach

### Figure 6-27. Provision of MOE Schedule extracted from PNAP ADV-33

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>USE</th>
<th>TOTAL ESCAPE ROOM AREA</th>
<th>TOTAL NUMBER OF PERSONS</th>
<th>NUMBER OF STORES PER FLOOR</th>
<th>NUMER OF STORES IN THE BUILDING</th>
<th>TOTAL ESCAPE VALUE OF THE BUILDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1FL</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2FL</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Figure 6-28. Provision of MOE produced by BIM approach

---

66
### Figure 6-29. Schedule of Sanitary Fitments extracted from PNAP ADV-33

<table>
<thead>
<tr>
<th>LOCATION OF USE</th>
<th>TOTAL USE</th>
<th>AREA (G)</th>
<th>TOTAL SANITARIUM AREA (G)</th>
<th>TOTAL WATER TANKER</th>
<th>NO. OF SANITARIUM TOILET</th>
<th>SANITARY FITMENTS REQUIRED</th>
<th>SANITARY FITMENTS INCLUDED</th>
<th>NO. OF WATER TANKER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Figure 6-30. Schedule of Sanitary Fitments produced by BIM approach

<table>
<thead>
<tr>
<th>LOCATION OF USE</th>
<th>USE</th>
<th>AREA (G)</th>
<th>TOTAL</th>
<th>M</th>
<th>F</th>
<th>PROD</th>
<th>PROD</th>
<th>PROD</th>
<th>PROD</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

---

GBP Submission Report

67
6.2 Latest Development of B.D. on BIM Use

PNAP ADV-34 was newly issued by B.D. in September 2016. The practice note provides general guidelines to AP, RSE and RGE on BIM submissions for building proposals as supplementary information to facilitate plan process by BD.

<table>
<thead>
<tr>
<th>Buildings Department</th>
<th>Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers</th>
<th>ADV-34</th>
</tr>
</thead>
</table>

**Building Information Modelling**

The use of Building Information Modelling (BIM) is a relatively new and innovative approach to building design and construction. The Buildings Department (BD) encourages authorized persons (AP), registered structural engineers (RSE) and registered geotechnical engineers (RGE) to consider adopting BIM in their building projects under the Buildings Ordinance. This practice note provides general guidelines on BIM submissions for building proposals as supplementary information to facilitate plan processing by the BD.

**BIM Submissions**

2. There is a wide range of applications of BIM on new building development and alteration and addition works which are considered useful to facilitate the BD in processing plan submissions. Some examples of BIM applications are given in Appendix A and the project AP/RSE/RGE are encouraged to provide the BD with a soft copy of the computer modelling information under the specified format for consideration.

**Format and Software Version**

3. In addition to the statutory requirement of plan submission in paper format, AP/RSE/RGE are encouraged to present their building and/or building works proposals by the computer aid of BIM information in digital format compatible with BIM viewing software or real-time simulation to enhance illustration of the proposals and/or the construction sequence of the proposed works in the following manner and format:-

(a) The data files should be stored in non-rewritable CD-ROM in ISO 9660 format (i.e. CD format) or non-rewriteable DVD-ROM in ISO/IEC 13346:1995 format (i.e. DVD format);

(b) BIM viewing software (but not web based BIM viewer) shall be available for free download from the Internet for viewing the BIM submission. The link to download the viewing software should also be provided by the AP/RSE/RGE. Each individual file for viewing on BIM viewing software should also be limited to the size of 30 MB; and

(c) The real-time simulation should be in Windows Media Video (wmv) or Audio Video Interleave (avi) format and supported by Windows Media Player 11 or above.
BIM Submission as Reference Material

4. Whilst BIM is submitted as a kind of supplementary information for reference, the BD processes approval of plans under the Buildings Ordinance based on the information contained in the plans. In case of any discrepancy between the plans and BIM submitted, the plans shall prevail. To keep pace with the development of BIM in the building industry, the BD will, from time to time, review the extent of BIM application and evaluate its effectiveness in the plan submission.

(HUI Siu-wai)
Building Authority

Ref. : BD GR/1-125/11/1
First Issue : September 2016 (AD/NB2)
Examples of application of BIM to supplement Plan Submissions

<table>
<thead>
<tr>
<th>Types of Plan Submission</th>
<th>Examples of Building Information to be illustrated by BIM</th>
<th>Real-time Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Building Plans</td>
<td>• innovative building design, irregular/twisted building form; • projecting features on external wall; • relationship between site profiles/street levels and proposed building; • arrangement of means of escape and compartmentation; • spatial arrangement of building; • relationship between existing building and proposed alteration and addition (A&amp;A) works.</td>
<td>• sequence and phasing of various stages of new building development; • sequence and phasing of A&amp;A works.</td>
</tr>
<tr>
<td>Drainage Plans</td>
<td>• complex drainage systems and/or connections • relationship between proposed underground drainage works and foundation works/site formation works etc.</td>
<td>• sequence and phasing of various stages of new building development; • sequence and phasing of A&amp;A works.</td>
</tr>
<tr>
<td>Superstructure Plans</td>
<td>• complex steel structures and/or connections; • arrangement of transfer structures and illustration of load path; • basement structures supporting adjoining ground and/or existing geotechnical features; • assembly sequence, structural arrangement and/or connection of façade/glass wall/curtain wall/cladding works, etc.; • relationship between existing structures and proposed A&amp;A works; • working space, temporary supports and strengthening in A&amp;A works.</td>
<td>• sequence and phasing of various stages of new building development; • sequence and phasing of A&amp;A works.</td>
</tr>
<tr>
<td>Foundation Plans</td>
<td>• relationship between proposed foundations, sub-structures, E&amp;LS works and geological ground profiles, adjoining existing foundations, geotechnical features, sensitive structures, etc.</td>
<td>• sequence and phasing of various stages of new building development; • top-down construction.</td>
</tr>
<tr>
<td>Excavation and Lateral Support (E&amp;LS) Plans</td>
<td>• relationship between site profiles, geological ground profiles and proposed works.</td>
<td>• sequence and phasing of various stages of new building development.</td>
</tr>
<tr>
<td>Site Formation Plans</td>
<td>• final stage of partial demolished structures.</td>
<td>• sequence and phasing of works, method statements and temporary precautionary measures.</td>
</tr>
</tbody>
</table>

Notes: Relevant stages of new building development may include demolition, foundation, E&LS, site formation, sub-structure and superstructure construction, as the case may be.
6.3 Immediate Term Suggestion

BIM Technology can facilitate presenting conventional measurements on plan. For example, in a BIM model, the calculation of discharge value and MOE Travel Distance Measurement can easily be done.

<table>
<thead>
<tr>
<th>STAIR NO.</th>
<th>WIDTH OF STAIRCASE (mm)</th>
<th>PERMITTED</th>
<th>TOTAL NO. OF FLOOR SERVED ABOVE G/F</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST-1</td>
<td>1125</td>
<td>420</td>
<td>1</td>
</tr>
<tr>
<td>ST-4</td>
<td>1688</td>
<td>640</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL PERMITTED DISCHARGE VALUE = 420 + 640 = 1060
TOTAL ACTUAL DISCHARGE VALUE = 425
TOTAL : 1060 > 425

Figure 6-31. Discharge Value schedule

Figure 6-32. Travel Distance Diagram
6.4 Medium Term Suggestion

In the traditional presentation of drawings in 2D format, the drawing up of 3D presentation of illustration purpose is extremely time consuming.

With BIM, as the model is already in 3D, issuing 3D drawings is not of much extra work. Thus, it can be a common deliverable with 3D illustrations showing the different part of a project, from the overall building outlook to smallest component part. Besides producing 2D drawings from the BIM model, calculation will also run automatically with related information. This can facilitate the Fire Compartmentation calculation with 3D model supported to counter some problematic building forms or irregular ceilings.

3D presentation, together with latest techniques such as hiding elements, making elements transparent or temporary exploding different components to derive better clarity, revealing a new way of communication, will deliver far better information than traditional 2D representation.

<table>
<thead>
<tr>
<th>Level</th>
<th>Department</th>
<th>Number</th>
<th>Name</th>
<th>Area</th>
<th>Room Height</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/F</td>
<td>A</td>
<td>A5</td>
<td>BR.3</td>
<td>4.824 m²</td>
<td>3000</td>
<td>14.472 m²</td>
</tr>
</tbody>
</table>

Figure 6-33. Compartmentation Diagram
6.5 Long Term Suggestion

The long term objective is the use of BIM Model Submission as GBP Submissions and Building Regulation Checking. Providing a BIM model for checking is a relatively efficient method of checking for government departments. It easily reveals the building elements hidden under plans. It reduces the tolerance of mislead drawings which costs variation orders, and minimizes the overall project sum and project duration.

With BIM models, we can produce architectural, structural and building services drawings. Traditional plans, elevations and sections can be generated with ease, showing all different aspects of the BIM model.

The 2D drawings can be created by putting views on the sheet in BIM software without layer function, (e.g. Revit). Then, these sheets can be published in DWFX or pdf format.

Moreover, Industry Foundation Classes (IFC) file can also be an alternative for BIM submission. It is cross platform BIM file format which can collaborate between programs.

One of the model checking applications is Solibri Model Checker, for BIM validation, compliance control, design review, analysis, extract BIM information and code checking. It has been used in the U.S. for model checking such as Egress and Occupancy and Accessibility Control, etc.
7 Appendix – Specifications

7.1 Introduction

This part explains the terminology used in GBP submission and how they can be translated into BIM terminology.

7.2 BIM Terminology (Specification Structure)

The enclosed Appendix-Specification explains the BIM approach for each statutory submission items.

Each specification contains the following:

a. Area of Concern is the category of Submission as describe in sections 3.4.1-3.4.5.
b. Statutory Submittal refers to the terminology used in statutory submission.
c. The Objectives as stated in relevant regulations explains the purpose of a specific submittal.
d. Logics is the calculation method/ definition in Building Ordinance and PNAP.
e. Specifications translate the “Logics” part into common BIM terminology.
f. BIM Approach means how the statutory submittal can be done by BIM technology, and supported by an example in BIM software.
<table>
<thead>
<tr>
<th>Format</th>
<th>Drawing</th>
<th>Statutory Submittal</th>
<th>Site Boundary</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNAP</td>
<td>N/A</td>
<td></td>
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<td>3.4.2 Checking of GFA</td>
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<tr>
<td>PNAP Link</td>
<td>N/A</td>
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<td></td>
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<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>Lease Information</td>
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<td>Regulation Link</td>
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<td></td>
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<tr>
<td>Logics</td>
<td>Site boundary of the project</td>
<td></td>
<td></td>
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<tr>
<td>Specifications</td>
<td>Define the site boundary according to survey data provided by Registered Land Surveyors / Government Lease Information</td>
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<td></td>
<td></td>
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<tr>
<td>BIM Approach</td>
<td>Use &quot;Property Line&quot; tool to define Site boundary.</td>
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<td></td>
<td></td>
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<tr>
<td>Format</td>
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<td>Statutory Submittal</td>
<td>Site Area Calculations</td>
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<tr>
<td>Objectives</td>
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<tr>
<td>Logics</td>
<td>The site area determined for the project</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>AP to determine area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to define Site Area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## SITE AREA CALCULATIONS:

**SITE AREA (FROM LEASE)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>L. 897 S. B ss 1 S.A</td>
<td>1051.67 sq. ft.</td>
</tr>
<tr>
<td>L. 897 S. B ss 5 S.A</td>
<td>270.43 sq. ft.</td>
</tr>
<tr>
<td>L. 897 S. B ss 5 R.P</td>
<td>1363.98 sq. ft.</td>
</tr>
<tr>
<td>L. 897 S. B ss 3</td>
<td>6251.37 sq. ft.</td>
</tr>
<tr>
<td>L. 897 S. B ss 9</td>
<td>1636.89 sq. ft.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7604.34 sq. ft. (706.460 sq. m. )</td>
</tr>
<tr>
<td>Format</td>
<td>Calculations</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
</tr>
<tr>
<td>PNAP</td>
<td>APP-124</td>
</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>Cap 123F reg 18A</td>
</tr>
<tr>
<td>Objectives</td>
<td>To determine site classification</td>
</tr>
</tbody>
</table>
| Logics | (1) In this Part and the First and Second Schedules—
“class A site” (甲類地盤) means a site, not being a class B site or class C site, that abuts on one specified street not less than 4.5 m wide or on more than one such street;
“class B site” (⼄類地盤) means, subject to paragraph (2), a corner site that abuts on 2 specified streets neither of which is less than 4.5 m wide;
“class C site” (丙類地盤) means, subject to paragraph (2), a corner site that abuts on 3 specified streets none of which is less than 4.5 m wide.
(2) For the purposes of paragraph (1)—
(a) a corner site shall not be regarded as abutting on 2 specified streets unless at least 40 per cent of the boundary of the site abuts on the streets; and
(b) a corner site shall not be regarded as abutting on 3 specified streets | | |
| Specifications | AP to determine Class A, B or C | | | |
| BIM Approach | Definite Site Classification Parameter for automatic search of Appropriate tables | | | |
UNDER BUILDING (PLANNING) REGULATIONS:

CLASS OF SITE: A
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Mean Street Level</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNAP</td>
<td>N/A</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PNAP Link</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>To calculate height of a building for purposes of B(P)R 20, 21 and 22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>(S(lowest)T-S(lowest)B)/2 where S(lowest) = lowest street, T = Top Level; B = Bottom Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Set Mean Street Level as parameter</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987, L.N. 110 of 2005)
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<tr>
<th>Format</th>
<th>Calculations</th>
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<th>Building Height</th>
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<tbody>
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</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
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<td></td>
<td>Cap 123F reg 23 (1)</td>
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<tr>
<td>Objectives</td>
<td>To calculate height of a building for purposes of B(P)R 20, 21 and 22</td>
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<td></td>
</tr>
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<td>Logics</td>
<td>(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)</td>
<td></td>
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</tr>
<tr>
<td>Specifications</td>
<td>Main Roof Level (Structural Floor Level) - Mean Street Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Automatic calculation of Main Roof Level - Mean Street Level Parameter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CIC Preparation of BIM Standards for GBP Submission
Relevant Table

(1) For the purposes of regulations 20, 21 and 22, the height of a building shall be measured from the mean level of the street or streets on which it fronts or abuts being a specified street or specified streets not less than 4.5 m wide, or where the building abuts on specified streets not less than 4.5 m wide having different levels, from the mean level of the lower or lowest of such streets, to the mean height of the roof over the highest usable floor space in the building. (L.N. 406 of 1987; L.N. 110 of 2005)

BIM Example

BUILDING HEIGHT CALCULATIONS:

TOTAL BUILDING HEIGHT

135.240 (MAIN ROOF LEV.) – 20.740 (MEAN ROAD LEV.)

= 114.500 m

PODIUM HEIGHT

35.250 (PODIUM LEV.) – 20.740 (MEAN ROAD LEV.)

= 14.510 m
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Permitted Non-domestic Site Coverage</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNAP</td>
<td>APP-19 &amp; APP-132</td>
<td></td>
<td></td>
<td>3.4.2 Checking of GFA</td>
</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>Cap 123F reg 21 &amp; First Schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>The expression &quot;permitted percentage site coverage&quot; (准許上蓋面積百分率) means the maximum site coverage permitted under paragraph (2).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>(1) The maximum site coverage permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 20; Refer table in First Schedule</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Specifications</td>
<td>Lookup values from First Schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Lookup values from First Schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## First Schedule

<table>
<thead>
<tr>
<th>Height of building in metres</th>
<th>Domestic buildings</th>
<th>Non-domestic buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage site coverage</td>
<td>Plot ratio</td>
</tr>
<tr>
<td>Class A site</td>
<td>Class B site</td>
<td>Class C site</td>
</tr>
<tr>
<td>Not exceeding 15 m</td>
<td>66.6</td>
<td>75</td>
</tr>
<tr>
<td>Over 15 m but not exceeding 18 m</td>
<td>60</td>
<td>67</td>
</tr>
<tr>
<td>Over 18 m but not exceeding 21 m</td>
<td>56</td>
<td>62</td>
</tr>
<tr>
<td>Over 21 m but not exceeding 24 m</td>
<td>52</td>
<td>58</td>
</tr>
</tbody>
</table>

- **PERMITTED NON-DOMESTIC SC (%):** 60
- **PERMITTED DOMESTIC SC (%):** 33.33
- **PERMITTED NON-DOMESTIC PR:** 15
- **PERMITTED DOMESTIC PR:** 8
<table>
<thead>
<tr>
<th>Format and Calculation</th>
<th>Statutory Submittal</th>
<th>Non-domestic site coverage outline</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PNAP</strong></td>
<td>N/A</td>
<td>Cap 123F reg 2</td>
<td>3.4.2 Checking of GFA</td>
</tr>
<tr>
<td><strong>PNAP Link</strong></td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Building Ordinance/Regulations/COP</strong></td>
<td>Cap 123F reg 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Regulation Link</strong></td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Logics</strong></td>
<td>Site coverage (上蓋面積) means the area of the site that is covered by the building that is erected thereon and, when used in relation to a part of a composite building, means the area of the site on which the building is erected that is covered by that part of the building; (G.N.A. 97 of 1962)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Specifications</strong></td>
<td>Total area outlined from top view of non-domestic part of building including all building elements.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BIM Approach</strong></td>
<td>Set &quot;View Depth&quot; to the lowest floor to include all building elements then draw area boundary.</td>
<td></td>
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</tbody>
</table>
 Relevant Table

 BIM Example

 SITE COVERAGE DIAGRAM
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Non-accountable Non-domestic site coverage (SC)</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNAP</td>
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<td></td>
<td></td>
<td>3.4.2 Checking of GFA</td>
</tr>
<tr>
<td>PNAP Link</td>
<td>N/A</td>
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</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>Cap 123F reg 2</td>
<td></td>
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<td>Regulation Link</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>AP to determine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>Demarcate area on an area plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to demarcate area</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Format</td>
<td>Calculations</td>
<td>Statutory Submittal</td>
<td>Actual non-domestic Site Coverage</td>
<td>Area of Concern</td>
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<tr>
<td>--------</td>
<td>--------------</td>
<td>---------------------</td>
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<td>3.4.2 Checking of GFA</td>
</tr>
<tr>
<td>PNAP</td>
<td>APP-19 &amp; APP-132</td>
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<td>Building Ordinance/ Regulations/ COP</td>
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<tr>
<td>Objectives</td>
<td>N/A</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>Non-domestic SC outline - non-accountable non-domestic SC</td>
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<tr>
<td>Specifications</td>
<td>Non-domestic SC outline - non-accountable non-domestic SC</td>
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<tr>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to demarcate non-domestic SC outline - non-accountable non-domestic SC</td>
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<td>Statutory Submittal</td>
<td>Permitted domestic Site Coverage</td>
<td>Area of Concern</td>
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<tr>
<td>--------</td>
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<td>Objectives</td>
<td>the expression &quot;permitted percentage site coverage&quot; (准許上蓋面積百分率) means the maximum site coverage permitted under paragraph (2).</td>
<td></td>
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<tr>
<td>Logics</td>
<td>(1) The maximum site coverage permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 20; Refer table in First Schedule</td>
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<tr>
<td>Specifications</td>
<td>Lookup values from First Schedule</td>
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<td>BIM Approach</td>
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# First Schedule

<table>
<thead>
<tr>
<th>Height of building in metres</th>
<th>Domestic buildings</th>
<th>Non-domestic buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage site coverage</td>
<td>Plot ratio</td>
</tr>
<tr>
<td></td>
<td>Class A site</td>
<td>Class B site</td>
</tr>
<tr>
<td>Not exceeding 15 m</td>
<td>66.6  75  80</td>
<td>3.3  1.75  4.0</td>
</tr>
<tr>
<td>Over 15 m but not exceeding 18 m</td>
<td>60  67  72</td>
<td>3.6  4.0  4.3</td>
</tr>
<tr>
<td>Over 18 m but not exceeding 21 m</td>
<td>56  62  67</td>
<td>3.9  4.3  4.7</td>
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<tr>
<td>Over 21 m but not exceeding 24 m</td>
<td>52  58  63</td>
<td>4.2  4.6  5.0</td>
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</tbody>
</table>

**PERMITTED NON-DOMESTIC SC (%)**: 60  
**PERMITTED DOMESTIC SC (%)**: 33.33  
**PERMITTED NON-DOMESTIC PR**: 15  
**PERMITTED DOMESTIC PR**: 8
<table>
<thead>
<tr>
<th>Format</th>
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<tr>
<td>Objectives</td>
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<tr>
<td>Specifications</td>
<td>Total area outlined from top view of non-domestic part of building including all building elements.</td>
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</tr>
<tr>
<td>BIM Approach</td>
<td>Set &quot;View Depth&quot; to the lowest floor to include all building elements then draw area boundary.</td>
<td></td>
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<tr>
<td>Area of Concern</td>
<td>Format</td>
<td>Calculations</td>
<td>Statutory Submittal</td>
<td>Non-accountable Domestic site coverage (SC)</td>
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<td></td>
<td>Logics</td>
<td>AP to determine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specifications</td>
<td>Demarcate area on an area diagram view</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to demarcate area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Format</td>
<td>Calculations</td>
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<thead>
<tr>
<th>Statutory Submittal</th>
<th>Permitted Non-domestic Plot Ratio</th>
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</thead>
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</table>

<table>
<thead>
<tr>
<th>Area of Concern</th>
<th>3.4.2 Checking of GFA</th>
</tr>
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<table>
<thead>
<tr>
<th>Building Ordinance/ Regulations/ COP</th>
<th>Cap 123F reg 21 &amp; First Schedule</th>
</tr>
</thead>
</table>

|-----------------|--------------------------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th>Objectives</th>
<th>(2) The maximum plot ratio permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 21.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Logics</th>
<th>Refer table in First Schedule</th>
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<table>
<thead>
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<th>Specifications</th>
<th>Lookup values from First Schedule</th>
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<table>
<thead>
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</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>

CIC Preparation of BIM Standards for GBP Submission
### First Schedule

<table>
<thead>
<tr>
<th>Height of building in metres</th>
<th>Domestic buildings</th>
<th>Non-domestic buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage site coverage</td>
<td>Plot ratio</td>
</tr>
<tr>
<td></td>
<td>Class A site</td>
<td>Class B site</td>
</tr>
<tr>
<td>Not exceeding 15 m</td>
<td>66.6</td>
<td>75</td>
</tr>
<tr>
<td>Over 15 m but not exceeding 18 m</td>
<td>60</td>
<td>67</td>
</tr>
<tr>
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<td>Over 21 m but not exceeding 24 m</td>
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</tr>
</tbody>
</table>

### PERMITTED NON-DOMESTIC SC (%): 60

### PERMITTED DOMESTIC SC (%): 33.33

### PERMITTED NON-DOMESTIC PR: 15

### PERMITTED DOMESTIC PR: 8
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Non-Domestic GFA outline</th>
<th>Area of Concern</th>
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</thead>
<tbody>
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<td>(3) (a) Subject to sub-paragraph (b), for the purposes of regulations 19, 20, 21 and 22, the gross floor area of a building shall be the area contained within the external walls of the building measured at each floor level (including any floor below the level of the ground), together with the area of each balcony in the building, which shall be calculated from the overall dimensions of the balcony (including the thickness of the sides thereof), and the thickness of the external walls of the building.</td>
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<td>Use &quot;Area Plan&quot; to demarcate GFA</td>
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<td>...exempting or disregarding green and amenity features and non-mandatory / non-essential plant rooms and services from gross floor area and/or site coverage calculations...</td>
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<td>Non-domestic GFA outline per floor - non-domestic GFA concession per floor</td>
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<td>Domestic GFA outline per floor - domestic GFA concession per floor</td>
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## GROUND FLOOR GFA

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<td>To ensure the total GFA does not exceed the Maximum Floor Area calculated from Permitted Plot Ratio.</td>
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<td>Specifications</td>
<td>Adding up of Actual GFA of all floors</td>
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<td>BIM Approach</td>
<td>Use &quot;Schedule&quot; to add up of actual GFA of all floors</td>
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### GROUND FLOOR GFA

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<td><strong>Total</strong></td>
<td><strong>128.613</strong></td>
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<td>the plot ratio of a building shall be obtained by dividing the gross floor area of the building by the area of the site on which the building is erected.</td>
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<td>Cap 123F reg 21 &amp; First Schedule</td>
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<td>(2) The maximum plot ratio permitted in respect of a building or buildings on a class A site, class B site or class C site shall be determined in accordance with regulation 21.</td>
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<td>Logics</td>
<td>Refer table in First Schedule</td>
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# First Schedule

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<thead>
<tr>
<th>Height of building in metres</th>
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<th>Non-domestic buildings</th>
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<td></td>
<td>Percentage site coverage</td>
<td>Plot ratio</td>
<td>Percentage site coverage</td>
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<tr>
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<td>Class A site</td>
<td>Class B site</td>
<td>Class C site</td>
</tr>
<tr>
<td>Not exceeding 15 m</td>
<td>66</td>
<td>75</td>
<td>80</td>
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<tr>
<td>Over 15 m but not exceeding 18 m</td>
<td>60</td>
<td>67</td>
<td>72</td>
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<tr>
<td>Over 18 m but not exceeding 21 m</td>
<td>56</td>
<td>62</td>
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<td>Over 21 m but not exceeding 24 m</td>
<td>52</td>
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- **PERMITTED NON-DOMESTIC SC (%):** 60
- **PERMITTED DOMESTIC SC (%):** 33.33
- **PERMITTED NON-DOMESTIC PR:** 15
- **PERMITTED DOMESTIC PR:** 8
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<td>Subject to sub-paragraph (b), for the purposes of regulations 19, 20, 21 and 22, the gross floor area of a building shall be the area contained within the external walls of the building measured at each floor level (including any floor below the level of the ground), together with the area of each balcony in the building, which shall be calculated from the overall dimensions of the balcony (including the thickness of the sides thereof), and the thickness of the external walls of the building.</td>
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<td>Use &quot;Area Plan&quot; to Demarcate GFA</td>
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(C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

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<tr>
<td>Overall Domestic GFA (SQ.M):</td>
<td>5451.568</td>
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<tr>
<td>Overall Non-Domestic GFA (SQ.M):</td>
<td>128.613</td>
</tr>
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<td>Overall Total GFA (SQ.M):</td>
<td>5451.568 + 128.613</td>
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<tr>
<td>Domestic Lift Shaft Area (SQ.M):</td>
<td>212.420</td>
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<tr>
<td>Maximum Exempted GFA (SQ.M):</td>
<td>5580.181 x 3.5%</td>
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<td>195.305</td>
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<td>Actual Exempted GFA (SQ.M):</td>
<td>212.420 - 5580.181 x 2.5%</td>
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<td>72.915 (MAX. 195.305)</td>
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<td>Actual Domestic GFA (SQ.M):</td>
<td>5451.568 - 72.915</td>
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<tr>
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<td>Use &quot;Schedule&quot; to add up of Actual Domestic GFA of all floors</td>
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### (C) ACTUAL TOTAL G.F.A. CALCULATION FOR DOMESTIC:

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<td>128.613</td>
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<tr>
<td>Overall Total GFA (SQ.M):</td>
<td>Overall Domestic GFA + Overall Non-Domestic GFA</td>
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<tr>
<td>Domestic Lift Shaft Area (SQ.M):</td>
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<td>Maximum Exempted GFA (SQ.M):</td>
<td>Maximum Domestic Lift Shaft Area x 3.5%</td>
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<td>Specifications</td>
<td>Actual domestic GFA / Site area</td>
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<td>BIM Approach</td>
<td>Use &quot;Schedule&quot; to get the result of Actual domestic GFA / Site area</td>
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Relevant Table

BIM Example

ACTUAL DOMESTIC PR:

5378.653/706.46
7.614<7.903
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<tr>
<td>Logics</td>
<td>In determining the gross floor area for the purposes of regulations 20, 21 and 22, the Building Authority may disregard any floor space that he is satisfied is constructed or intended to be used solely for parking motor vehicles, loading or unloading of motor vehicles, or for refuse storage chambers, refuse storage and material recovery chambers, material recovery chambers, refuse storage and material recovery rooms, refuse chutes, refuse hopper rooms and other types of facilities provided to facilitate the separation of refuse to the satisfaction of the Building Authority, or for access facilities for telecommunications and broadcasting services, or occupied solely by machinery or equipment for any lift, air-conditioning or heating system or any similar service. (L.N. 406 of 1987; 39 of 2000 s. 7)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Specifications</td>
<td>Demarcate area on an area diagram view and list out</td>
<td></td>
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</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to demarcate area and schedule to list out</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### AREA OF GFA CONCESSIONS

<table>
<thead>
<tr>
<th>Name</th>
<th>AREA (SQ.M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBE ROOM</td>
<td>23.455 m²</td>
</tr>
<tr>
<td>POTABLE &amp; FLUSHING WATER TANK</td>
<td>37.307 m²</td>
</tr>
<tr>
<td>PUMP ROOM</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL ROOM</td>
<td>9.720 m²</td>
</tr>
<tr>
<td>MAIN SWITCH ROOM</td>
<td>20.494 m²</td>
</tr>
<tr>
<td>TRANSFORMER ROOM</td>
<td>25.753 m²</td>
</tr>
<tr>
<td>TRANSFORMER ROOM</td>
<td>22.446 m²</td>
</tr>
<tr>
<td>SPRINKLER PUMP RM.</td>
<td>27.943 m²</td>
</tr>
<tr>
<td>ELECTRICAL ROOM</td>
<td>3.950 m²</td>
</tr>
<tr>
<td>FILTRATION PLANT ROOM</td>
<td>49.183 m²</td>
</tr>
<tr>
<td>CLEANSING WATER PUMP RM</td>
<td>19.653 m²</td>
</tr>
<tr>
<td>WATER METER RM.</td>
<td>3.500 m²</td>
</tr>
<tr>
<td>ELECT. RM.</td>
<td>2.849 m²</td>
</tr>
<tr>
<td>ELEC. RM.</td>
<td>1.457 m²</td>
</tr>
<tr>
<td>EMERGENCY GENERATOR ROOM</td>
<td>25.980 m²</td>
</tr>
<tr>
<td>NON-ESSENTIAL GENERATOR RM.</td>
<td>16.745 m²</td>
</tr>
<tr>
<td>LOADING/ UNLOADING</td>
<td>24.500 m²</td>
</tr>
<tr>
<td>METER ROOM</td>
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<tr>
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<tr>
<td>METER ROOM</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>333.284 m²</td>
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<td>Regulation Link</td>
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<tr>
<td>Objectives</td>
<td>...The industry is encouraged to explore ways to improve environmental performance during the construction and throughout the life cycle of new buildings by incorporating... a list of green features that may, subject to the conditions specified in subsequent paragraphs, be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations...</td>
</tr>
<tr>
<td>Logics</td>
<td>The following green features may upon application and subject to conditions be excluded from GFA and/or SC calculations under the Buildings Ordinance: (a) Balconies for residential buildings; (b) Wider common corridors and lift lobbies for residential buildings; (c) Communal sky gardens for residential buildings; (d) Communal podium gardens for non-residential buildings (e) Acoustic fins; and (f) Wing walls, wind catchers and funnels.</td>
</tr>
<tr>
<td>Specifications</td>
<td>Demarcate area on an area diagram view and list out</td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Area plan&quot; to demarcate area and schedule to list out</td>
</tr>
</tbody>
</table>
## AREA OF GFA CONCESSIONS

<table>
<thead>
<tr>
<th>Name</th>
<th>AREA (SQ.M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBE ROOM</td>
<td>23.455 m²</td>
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<tr>
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<td>37.307 m²</td>
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<tr>
<td>ELECTRICAL ROOM</td>
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<td>2.849 m²</td>
</tr>
<tr>
<td>ELEC. RM</td>
<td>1.457 m²</td>
</tr>
<tr>
<td>EMERGENCY GENERATOR ROOM</td>
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<td>METER ROOM</td>
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<td>13.517 m²</td>
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<tr>
<td>METER ROOM</td>
<td>2.010 m²</td>
</tr>
<tr>
<td>TOTAL</td>
<td>333.284 m²</td>
</tr>
</tbody>
</table>
### Logics

2. The following green features may upon application and subject to conditions be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations under the Buildings Ordinance:

(a) Non-structural prefabricated external walls;
(b) Utility platforms for residential buildings;
(c) Noise barriers; and
(d) Communal sky gardens for non-residential buildings.

### Objectives

...The industry is encouraged to explore ways to improve environmental performance during the construction and throughout the life cycle of new buildings by incorporating... a list of green features that may, subject to the conditions specified in subsequent paragraphs, be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations...

### Specifications

Demarcate area on an area diagram view and list out

### BIM Approach

Use "Area Plan" to demarcate area and Schedule to list out
### Area of GFA Concessions

<table>
<thead>
<tr>
<th>Name</th>
<th>Area (sq.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBE ROOM</td>
<td>23.455 m²</td>
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<tr>
<td>Format</td>
<td>Calculations</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
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<td>Building Ordinance/ Regulations/ COP</td>
<td>N/A</td>
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<tr>
<td>Regulation Link</td>
<td>N/A</td>
</tr>
<tr>
<td>Objectives</td>
<td>Amenity features are loosely defined as those elements of design that whilst not statutory requirements are desirable to improve the standard and quality of a building or a development project. Provision of such features enhances the sense of care and pride for buildings, thereby inducing proper maintenance and repair.</td>
</tr>
<tr>
<td>Logics</td>
<td>Refer relevant PNAPs</td>
</tr>
<tr>
<td>Specifications</td>
<td>Demarcate area on an area diagram view and list out</td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Area Plan&quot; to demarcate area and Schedule to list out</td>
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<td>2.010 m²</td>
</tr>
<tr>
<td>TOTAL</td>
<td>333.284 m²</td>
</tr>
</tbody>
</table>
(1) (a) Every domestic building on a class A or B site or on a class C site shall have within the site an open space at the rear, or partly at the rear and partly at the side, at a level of not less than 150 mm below the floor of the lowermost storey in accordance with the Second Schedule:
<table>
<thead>
<tr>
<th>Item</th>
<th>Class of site</th>
<th>Open space required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Class A site.</td>
<td>Not less than one-half of the roofed-over area of the building.</td>
</tr>
<tr>
<td>2.</td>
<td>Class B site.</td>
<td>Not less than one-third of the roofed-over area of the building.</td>
</tr>
<tr>
<td>3.</td>
<td>Class C site.</td>
<td>Not less than one-quarter of the roofed-over area of the building.</td>
</tr>
</tbody>
</table>

(G.N.A. 97 of 1962; L.N. 82 of 1963)
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Usable Floor Area</th>
<th>Area of Concern</th>
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<td></td>
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<td>Building Ordinance/ Regulations/COP</td>
<td>FS CODE 2011 Section 3</td>
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<td>Objectives</td>
<td>N/A</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>“Usable floor area” means the aggregate of the areas of the floor or floors in a storey or a building excluding, unless otherwise specified, any staircase, public circulation space, lift landings, lavatories, water-closets, kitchens in flats, and any space occupied by machinery for any lift, air-conditioning system or similar service provided for the building.</td>
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<tr>
<td>BIM Approach</td>
<td>Use &quot;Room&quot; tool to measure area &amp; create Schedule</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Relevant Table**

Usable floor space (實用樓面空間) means any floor space other than staircases, staircase halls, lift landings, the space used in providing water-closet fitments, urinals and lavatory basins and the space occupied by machinery for any lift, air-conditioning system or similar service; (G.N.A. 97 of 1962)

**BIM Example**

TYPICAL FLOOR U.F.A. DIAGRAM

1:100
### Format

<table>
<thead>
<tr>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Use Classification</th>
<th>Area of Concern</th>
</tr>
</thead>
</table>

### PNAP

- **PNAP**: N/A
- **PNAP Link**: N/A

### Building Ordinance/Regulations/COP


### Objectives

- **Objectives**: N/A

### Logics

- **“Use Classification” means the categories of use of premises stipulated in Table A1 of FS CODE 2011**

### Specifications

- **Specifications**: Lookup FS CODE 2011Table A1

### BIM Approach

- **BIM Approach**: Lookup FS CODE 2011Table A1
### Relevant Table

<table>
<thead>
<tr>
<th>LEVEL</th>
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<th>CLASS</th>
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<tbody>
<tr>
<td>1F</td>
<td>STAIRS TO 2F/3F</td>
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<td>2F</td>
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<td>2F</td>
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</tr>
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<td>3F</td>
<td>ELECTRICAL RM</td>
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</table>

**Source:** P:\BIM Project\P15026 CIC Preparation of BIM Standards for GBP Submission\07_Document\07_Photos\Regulation Example\C32 Table-A1.jpg
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<tr>
<th>Format</th>
<th>Calculations</th>
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<tbody>
<tr>
<td>PNAP</td>
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<tr>
<td>PNAP Link</td>
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</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>FS CODE 2011 Table B1</td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>“Occupant capacity” means the number of persons, which the room or storey or fire compartment of a building, for the purposes of this Code, is capable of holding. Provided that where there is on any storey the entrance to a maisonette, that storey shall, for the purpose of this definition, be deemed to include all floors of the maisonette.</td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>Lookup table FS CODE 2011 Table B1</td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Lookup table FS CODE 2011 Table B1</td>
<td></td>
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### 3.4.5 Checking of Fire Compartment and FRC

<table>
<thead>
<tr>
<th>Statutory Submittal</th>
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</thead>
<tbody>
<tr>
<td>Checking of Fire Compartment and FRC</td>
<td>Area of Concern</td>
</tr>
<tr>
<td>FS CODE 2011 Table B1</td>
<td>Area of Concern</td>
</tr>
</tbody>
</table>

**Objectives**

N/A

**Logics**

“Occupant capacity” means the number of persons, which the room or storey or fire compartment of a building, for the purposes of this Code, is capable of holding. Provided that where there is on any storey the entrance to a maisonette, that storey shall, for the purpose of this definition, be deemed to include all floors of the maisonette.
### Table 81: Assessment of Occupant Capacity

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Type of Accommodation</th>
<th>Occupancy Factor (related to area of space or number of occupants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Flats: - Flats &amp; apartments containing two floors or more - Residences rented by the hour or day - Flats not covered by the above</td>
<td>0.5</td>
</tr>
<tr>
<td>1c</td>
<td>Terraced houses</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Boarding houses, hostel, hotels, motels, guesthouses</td>
<td>Number of bedrooms</td>
</tr>
<tr>
<td>3a</td>
<td>Day care centres, nurseries, child care centres</td>
<td>0.5</td>
</tr>
<tr>
<td>3b</td>
<td>Hospital (areas other than patient care areas)</td>
<td>0.5</td>
</tr>
<tr>
<td>3c</td>
<td>Dental care areas</td>
<td>Number of patients</td>
</tr>
<tr>
<td>3d</td>
<td>Detention and Correctional Centres</td>
<td>Number of inmates</td>
</tr>
<tr>
<td>4a</td>
<td>Offices</td>
<td>10</td>
</tr>
<tr>
<td>4b</td>
<td>Industrial shops (department stores) (including areas and common areas)</td>
<td>2</td>
</tr>
</tbody>
</table>

### Schedule of Minimum Number & Width of Exit Door & Exit Route from Each Floor

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>FLOOR CAPACITY</th>
<th>MIN. NO. OF EXIT ROUTE</th>
<th>MIN. TOTAL WIDTH OF EXIT DOORS</th>
<th>EXIT ROUTE</th>
<th>MIN. WIDTH EACH</th>
<th>MIN. WIDTH EACH</th>
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</thead>
<tbody>
<tr>
<td>L/F</td>
<td>64</td>
<td>2</td>
<td>2</td>
<td>1790</td>
<td>1790</td>
<td>2100</td>
</tr>
<tr>
<td>H/F</td>
<td>36</td>
<td>2</td>
<td>2</td>
<td>1790</td>
<td>1790</td>
<td>2100</td>
</tr>
<tr>
<td>Format</td>
<td>Calculations</td>
<td>Statutory Submittal</td>
<td>Area of Concern</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
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<td>---------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNAP</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td><a href="http://N/A">http://N/A</a></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>FS CODE 2011 Table B2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>Base on Occupant Capacity, to look up COP 2011 Table B2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>Lookup table FS CODE 2011 Table B2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Lookup table FS CODE 2011 Table B2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Area of Concern**

3.4.3 Checking of Means of Escape

Minimum number and width of exit doors and exit routes from a room, fire compartment or storey.
### Relevant Table

<table>
<thead>
<tr>
<th>Occupant Capacity of compartment or storey (No. of persons)</th>
<th>Minimum No. of exit doors or exit routes</th>
<th>Minimum total width (in mm)</th>
<th>Minimum Width (in mm) of each</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-30</td>
<td>1</td>
<td>Exit door: 750</td>
<td>Exit route: 1500</td>
</tr>
<tr>
<td>31-120</td>
<td>2</td>
<td>Exit door: 1750</td>
<td>Exit route: 2100</td>
</tr>
<tr>
<td>121-299</td>
<td>2</td>
<td>Exit door: 2500</td>
<td>Exit route: 2500</td>
</tr>
<tr>
<td>301-500</td>
<td>2</td>
<td>Exit door: 3000</td>
<td>Exit route: 3000</td>
</tr>
<tr>
<td>501-750</td>
<td>3</td>
<td>Exit door: 4000</td>
<td>Exit route: 4000</td>
</tr>
<tr>
<td>751-1000</td>
<td>4</td>
<td>Exit door: 6000</td>
<td>Exit route: 6000</td>
</tr>
<tr>
<td>1001-1750</td>
<td>5</td>
<td>Exit door: 7500</td>
<td>Exit route: 7500</td>
</tr>
<tr>
<td>1751-2950</td>
<td>7</td>
<td>Exit door: 9000</td>
<td>Exit route: 9000</td>
</tr>
<tr>
<td>2951-5000</td>
<td>10</td>
<td>Exit door: 10000</td>
<td>Exit route: 10000</td>
</tr>
<tr>
<td>5001-10000</td>
<td>12</td>
<td>Exit door: 15000</td>
<td>Exit route: 15000</td>
</tr>
</tbody>
</table>

Note: The number of exit doors, exit routes, and their width shall be determined by the Building Authority.
<table>
<thead>
<tr>
<th>Format</th>
<th>Calculations</th>
<th>Sanitary Fitment Provision</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNAP</td>
<td>N/A</td>
<td></td>
<td>3.4.4 Checking of Sanitary Fitment Provision</td>
</tr>
<tr>
<td>PNAP Link</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Ordinance/ Regulations/ COP</td>
<td>Cap 123I reg 4, 5, 6, 6A, 7, 7A, &amp;B, 7C, 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>The number of watercloset fitments, urinals, lavatory basins, baths or showers, must not be less than the number specified their respective tables in the regulations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>The use of area (factor) and the usable floor area determine the number of sanitary provision.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>Lookup related regulation, Room area x factor (use) = Sanitary Fitment Provision of the area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>Use &quot;Schedule&quot; to calculate the Sanitary Fitment required by the use and area of the Room, then create a Sanitary Fitment Schedule</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Relevant Table

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column 3</td>
<td>Column 4</td>
</tr>
</tbody>
</table>

### BIM Example

#### Appendix Page 68 of 80

CIC Preparation of BIM Standards for GBP Submission
<table>
<thead>
<tr>
<th>Area of Concern</th>
<th>Format</th>
<th>Statutory Submittal</th>
<th>Maximum fire compartment area</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.5 Checking of Fire Compartment and FRC</td>
<td>Calculations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PNAP</th>
<th>PNAP Link</th>
<th>Building Ordinance/ Regulations/ COP</th>
<th>Regulation Link</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Specifications</th>
<th>BIM Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.</td>
<td>To look up FS2011 Table C1</td>
<td>To look up FS2011 Table C1</td>
</tr>
</tbody>
</table>
Table C1 - Fire Resistance Rating and Fire Compartment Limitations

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Compartment Area/Volume</th>
<th>Fire Resistance Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>2. Hotel and similar Transient Accommodation</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4. Commercial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Business Facilities</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4b. Mercantile Facilities</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>Format</td>
<td>Calculations</td>
<td>Statutory Submittal</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>PNAP</td>
<td>N/A</td>
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<tr>
<td>PNAP Link</td>
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</tr>
<tr>
<td>Building Ordinance/ Regulations/COP</td>
<td>FS CODE 2011 Subsection C3</td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.</td>
<td></td>
</tr>
<tr>
<td>Logics</td>
<td>To look up FS2011 Table C1</td>
<td></td>
</tr>
<tr>
<td>Specifications</td>
<td>To look up FS2011 Table C1</td>
<td></td>
</tr>
<tr>
<td>BIM Approach</td>
<td>To look up FS2011 Table C1</td>
<td></td>
</tr>
</tbody>
</table>
### Table C1 – Fire Resistance Rating and Fire Compartment Limitations

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Compartment Area/Volume</th>
<th>Fire Resistance Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>2. Hotel and similar transient</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>Accommodation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4. Commercial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Business Facilities</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4b. Mercantile Facilities</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

### BIM Example

![BIM Example Diagram](p:\BIM Project\P15026 CIC Preparation of BIM Standards for GBP Submission\07\Document\07\Photos\FRR_Actual fire compartment volume.jpg)

![BIM Example Diagram](p:\BIM Project\P15026 CIC Preparation of BIM Standards for GBP Submission\07\Document\07\Photos\Fire Compartment.jpg)
### Format

<table>
<thead>
<tr>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Actual fire compartment area</th>
<th>Area of Concern</th>
</tr>
</thead>
</table>

### PNAP

| N/A | 3.4.5 Checking of Fire Compartment and FRC |

### PNAP Link

| N/A | FS CODE 2011 Subsection C3 |

### Building Ordinance/ Regulations/ COP


### Regulation Link

### Objectives

Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.

### Logics

“Fire compartment” means a space enclosed by fire barriers or appropriate construction to all sides such that fire will not spread from the space, or spread into adjoining space.

### Specifications

The Compartment Area and the Fire Resisting Rating will be limited by the use of the building

### BIM Approach

Use of "Area Plan" to outline all the Compartment Area of the floor

---

CIC Preparation of BIM Standards for GBP Submission

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### Relevant Table

**Table C1 – Fire Resistance Rating and Fire Compartment Limitations**

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Compartment Area/Volume</th>
<th>Fire Resistance Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>2. Hotel and similar</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>Transient Accommodation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4. Commercial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Business Facilities</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4b. Mercantile Facilities</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>not exceeding 10,500m²</td>
<td></td>
</tr>
</tbody>
</table>

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**BIM Example**

![BIM Example](image-url)

---

Appendix Page 74 of 80
### Format

<table>
<thead>
<tr>
<th>Calculations</th>
<th>Statutory Submittal</th>
<th>Actual fire compartment volume</th>
<th>Area of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.4.5 Checking of Fire Compartment and FRC</td>
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</tbody>
</table>

### PNAP

| N/A |

### PNAP Link

| N/A |

### Building Ordinance/ Regulations/ COP

| FS CODE 2011 Clause C3.1 |

### Regulation Link


### Objectives

Every building should be divided into fire compartments by fire barriers without exceeding the fire compartment area/volume specified in Table C1 in order to inhibit the spread of fire.

### Logics

“Fire compartment” means a space enclosed by fire barriers or appropriate construction to all sides such that fire will not spread from the space; or spread into adjoining space.

### Specifications

The Compartment Volume and the Fire Resisting Rating will be limited by the use of the building

### BIM Approach

Use "Schedule" to calculate Room height and Compartment Area
### Table C1 – Fire Resistance Rating and Fire Compartment Limitations

<table>
<thead>
<tr>
<th>Use Classification</th>
<th>Compartment Area/Volume</th>
<th>Fire Resistance Rating (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>2. Hotel and similar Transit Accommodation</td>
<td>Not limited</td>
<td>60</td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4. Commercial:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4a. Business Facilities</td>
<td>Not exceeding 10,500m²</td>
<td>60</td>
</tr>
<tr>
<td>4b. Mercantile Facilities</td>
<td>Not exceeding 2,500m²</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Exceeding 2,500m² but not exceeding 10,500m²</td>
<td>120</td>
</tr>
<tr>
<td>Area of Concern</td>
<td>Required Fire Resistance Rating of Fire compartment</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------</td>
<td></td>
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<tr>
<td>Checking of Fire Compartment and FRC</td>
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<table>
<thead>
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</thead>
<tbody>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

| PNAP | N/A |

| PNAP Link | N/A |

| Building Ordinance/ Regulations/ COP | |


| Objectives | Every element of construction within each fire compartment and every fire barrier of each fire compartment should have an FRR of not less than that as specified in Table C1. |

| Logics | To look up FS2011 Table C1 |

| Specifications | To look up FS2011 Table C1 |

| BIM Approach | To look up FS2011 Table C1 |
### Relevant Table

<table>
<thead>
<tr>
<th>Non-Classification</th>
<th>Compartment Area (m²)</th>
<th>Fire Resistance Rating (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential</td>
<td>Not exceeding 2,000m²</td>
<td>90</td>
</tr>
<tr>
<td>2. Commercial</td>
<td>Not exceeding 7,000m²</td>
<td>90</td>
</tr>
<tr>
<td>3. Institutional</td>
<td>Not exceeding 2,000m²</td>
<td>90</td>
</tr>
<tr>
<td>4. Assembly</td>
<td>Not exceeding 7,000m²</td>
<td>90</td>
</tr>
<tr>
<td>5. Educational</td>
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</tr>
<tr>
<td>6. Transport facilities</td>
<td>Not exceeding 7,000m²</td>
<td>90</td>
</tr>
<tr>
<td>7. Industrial</td>
<td>Not exceeding 7,000m²</td>
<td>90</td>
</tr>
</tbody>
</table>

### BIM Example

#### Five Resistance Requirements for Subsystems of Construction

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>NAME</th>
<th>CLASS</th>
<th>FCW (m²)</th>
<th>NM (m²)</th>
<th>MR (m²)</th>
<th>SM (m²)</th>
<th>E (m²)</th>
<th>R (m²)</th>
<th>FDW (m²)</th>
<th>FD (m²)</th>
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</thead>
<tbody>
<tr>
<td>GF</td>
<td>Lobby</td>
<td>Office</td>
<td>100.000</td>
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<td>50.000</td>
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<tr>
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<tr>
<td>GF</td>
<td>Library</td>
<td>Office</td>
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<td>50.000</td>
</tr>
<tr>
<td>GF</td>
<td>Elevator Lobby</td>
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<td>100.000</td>
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</tr>
<tr>
<td>GF</td>
<td>Elevator</td>
<td>Office</td>
<td>105.000</td>
<td>50.000</td>
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<td>Staircase Lobby</td>
<td>Office</td>
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<td>50.000</td>
<td>50.000</td>
<td>50.000</td>
<td>50.000</td>
<td>50.000</td>
</tr>
<tr>
<td>GF</td>
<td>Staircase</td>
<td>Office</td>
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<td>GF</td>
<td>Utilities</td>
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<tr>
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<tr>
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<td>IT Center</td>
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**Building Ordinance/Regulations/COP:**

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<th>Regulation Link</th>
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**Objectives:**

Such numbers of access staircases, fireman’s lifts and firefighting and rescue stairways should be provided in a building as required by the Building (Planning) Regulations 41A, 41B and 41C. The number of these means of access for firefighting and rescue as required are summarised in Table D1.

**Logics:**

To look up FS2011 Table D1

**Specifications:**

Annotate the selected fireman's lift

**BIM Approach:**

Use specific annotation and model to indicate the fireman's lift in use
### Table D1: Number of Access Staircases, Fireman’s Lift and Firefighting and Rescue Stairways Required

<table>
<thead>
<tr>
<th>Type of Building</th>
<th>No. of Access Staircases required</th>
<th>No. of Fireman’s Lifts required</th>
<th>No. of Firefighting and Rescue Stairways required</th>
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<tr>
<td>(1) All buildings and all basements, not exceeding 1 storey</td>
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<td>(2) corridor buildings, not exceeding 3 main storeys</td>
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<td>(3) Domestic buildings or offices with shops or shops and office</td>
<td>(a) exceeding 1 storey but not exceeding 0 storeys and uppermost floor not exceeding 17m above ground and usable floor area not exceeding 200m² per floor</td>
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<td>(b) exceeding 1 storey but not exceeding 0 storeys and uppermost floor exceeding 17m above ground and usable floor area not exceeding 110 m² per floor</td>
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</table>

#### BIM Example

![BIM Example Diagram](image-url)